PROJECTIONIST

INTERNATIONAL

JULY 1952

VOLUME 27 • NUMBER 7

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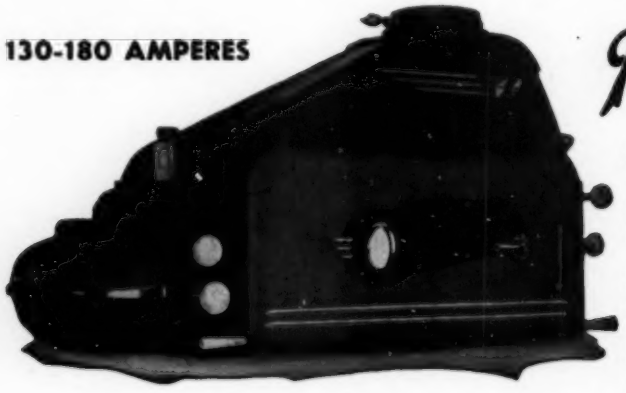

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HENRY B. SELLWOOD, *Editor*

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MONTHLY CHAT

ELSEWHERE in this issue is reported a summary of some figures published in the latest edition of *Film Daily Yearbook*, now off the press, whereby it appears that in the United States attendance and gross admissions were down in 1951 as compared with 1950.

And, on the same week these *Yearbook* figures appeared, *Variety* reported a trend toward drastic slashing of box office prices, down to the 25-35-cent level, in a strenuous effort to get the customers back.

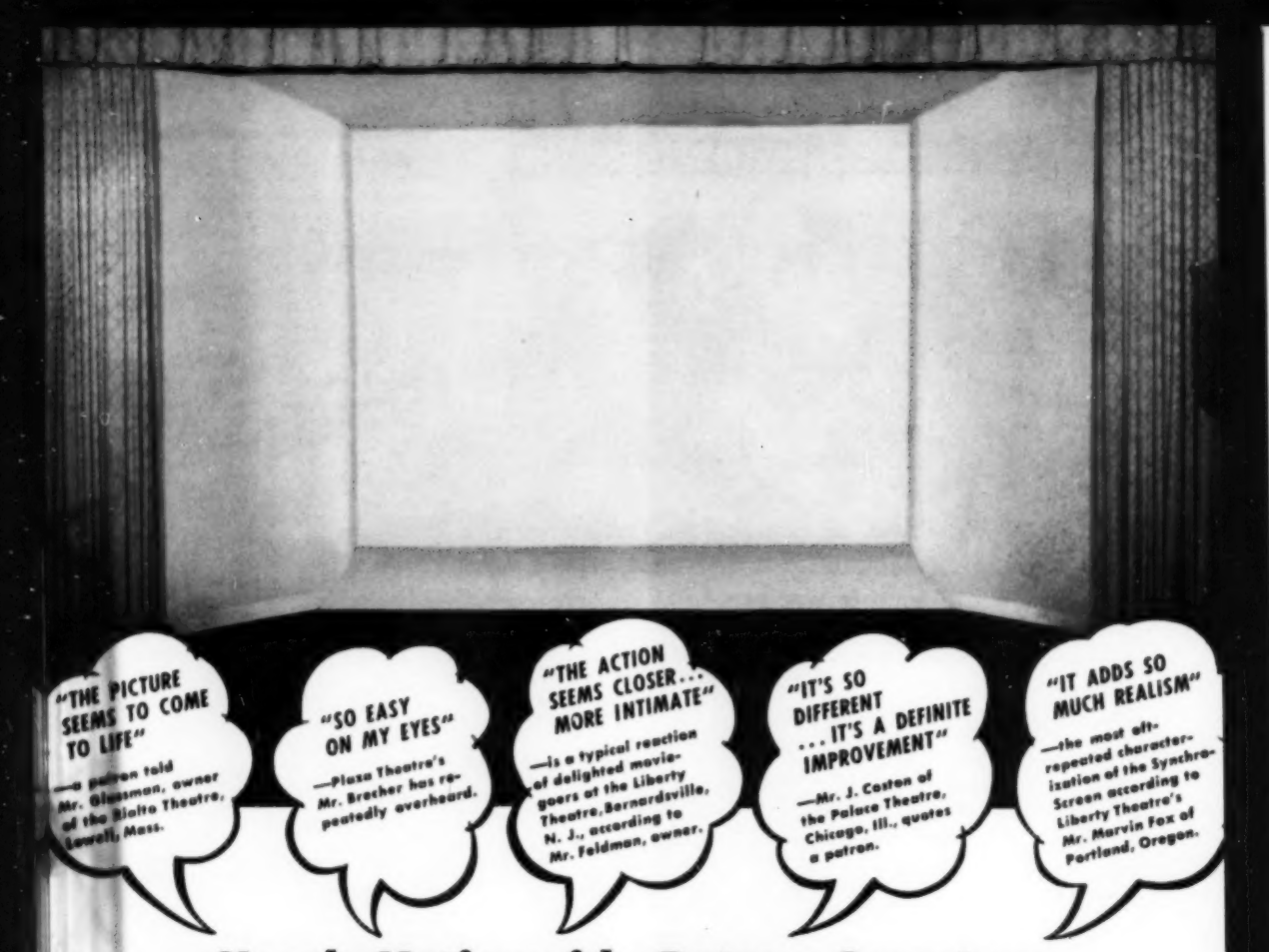
Of course 300 people at 25 cents pay just as much as 100 at 75 cents (and buy more popcorn). The catch is, obviously, that cutting the admission from 75 to 25 cents may not bring in 300, but only 200—or 400. There is no way under the sun to find out except by trying it. If the trend that *Variety* thinks it detects really materializes, the experiment will be made. This industry can't afford just now to overlook any experiment that may possibly be helpful.

* * *

Those *Yearbook* figures, however, reveal another facet of the industry situation which is decidedly uncheerful. Do you remember back in '46, '47 or '48 recommending new lamps or a new screen or some such needful thing, and being told that business did not justify the expense? Well, the figures show that those were the years when theatre attendance was the highest in history, higher even than during World War II; and admission prices were the highest in history up to that time. Admission prices have gone up further since—more than 25 per cent further—but the number of tickets sold has dropped 33 per cent. All in all, those years 1946, 1947 and 1948 look in the restrospective statistics like the most prosperous this industry has ever had, but did theatre-owners talk like it then?

Today, when the 90,000,000 admissions per week have dropped off to 60,000,000, very possibly the owner cannot afford, out of current take, those new amplifiers that should have been bought five years ago—but why didn't he buy 'em then? Didn't matter then?—90 millions came rushing in every week anyhow? Yes, but now when those improvements are so desperately needed to keep 'em coming, the income is inadequate.

Can it be that one of the troubles of the industry lies in a deep-rooted practice of transferring too large a percentage of gross profits from the business to the private pocket of the owner, at the expense of the amortization account and depreciation account? Have some owners been like the peon in the song who didn't need to fix the roof while the sun shone and couldn't during the storm?


"THE PICTURE SEEMS TO COME TO LIFE"
—a patron told Mr. Glassman, owner of the Rialto Theatre, Lowell, Mass.
"SO EASY ON MY EYES"
—Plaza Theatre's Mr. Brecher has repeatedly overheard.
"THE ACTION SEEMS CLOSER... MORE INTIMATE"
—is a typical reaction of delighted moviegoers at the Liberty Theatre, Bernardsville, N. J., according to Mr. Feldman, owner.
"IT'S SO DIFFERENT ... IT'S A DEFINITE IMPROVEMENT"
—Mr. J. Coston of the Palace Theatre, Chicago, Ill., quotes a patron.
"IT ADDS SO MUCH REALISM"
—the most oft-repeated characterization of the Synchro-Screen according to Liberty Theatre's Mr. Marvin Fox of Portland, Oregon.

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You'll get a personal thrill, too, out of seeing your pictures on Synchro-Screen. You can't imagine what a difference this one piece of equipment makes until you've actually seen it—until you've compared it with the results you are getting with your present black-mask screen.

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VOLUME XXVII JULY 1952 NUMBER 7

Heart of the Projector Mechanism

By ROBERT A. MITCHELL

THE INTERMITTENT MOVEMENT is the basic unit of the motion-picture projector—the one that translates the series of still photographs into a moving picture. Unless it functions smoothly and accurately, the projected moving picture will be unsteady, jumping, weaving, or trembling on the screen.

To attain the necessary accuracy in the registration of the successive film-photographs, all American projector manufacturers construct the component parts of their intermittent movements with a tolerance of less than 1/10,000 of an inch. The projectionist follows up the careful work of the manufacturer by maintaining the intermittents in good condition, keeping them properly lubricated and adjusted at all times, and replacing sprockets, star-wheels, and other parts whenever signs of wear become apparent.

To get a firm grasp of the theory of a motion-picture projector, it is necessary to consider *both* the intermittent *and* the rotating occulting shutter as an integrated system. Otherwise one might easily ignore the fact that the shutter must be "in time" with the intermittent no matter how the picture is framed. Many of the early builders of motion-picture machines did ignore this fact with the result that "travel-ghost" flared on the screen whenever the picture was framed up or down.

Travel Ghost

If the shutter be removed from a projector, bright travel-ghost streaks will extend vertically all the way from top to bottom of the screen. Moreover, these ghostly streaks will haunt all bright objects in the picture, following them around wherever they happen to go. Believe it or not, a "projectionist" once removed the shutters from both of his machines, and was very much pleased that the picture was brighter. Either he believed that "there ain't no sech thing as ghosts"! or the glass in his observation ports needed cleaning!

If the shutter gets out of time by even

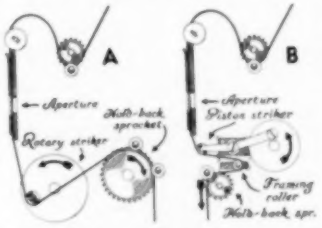

FIG. 1. The striker movement—it struck many a nickel into the coffers of the old-time nickelodeon. Rough on film and on the eyes of the audience, both the "dog" striker in *A* and the "piston" beater in *B* jiggled many a celluloid romance to its happy conclusion. The pull-down sprockets revolved at constant speed.

the tiniest amount, thereby cutting off the light a little too early or too late relative to the pulldown action of the intermittent sprocket, shorter ghosts will be seen as a flickering haze on either the top or bottom edges of all bright areas in the picture. The old saw anent travel-ghost bears repeating:

Ghost DOWNWARD, shutter EARLY;
Ghost UPWARD, shutter LATE.

Or, as a parallel to the hard life of the average projectionist: "Down early, up late."

Plain titles having white lettering on a black background reveal travel-ghost, if it exists at all, very prominently.

But it is not in the least necessary to wait for travel-ghost to make its appearance on the screen in order to deal with it. This defect can be prevented by setting the shutters before operating the projectors.*

If it happens that travel-ghosts appear on both the tops and bottoms of bright objects, the trouble is obviously much more serious than a merely mistimed shutter. If this double ghost makes its appearance only intermittently probably either the shutter itself or one of its driving gears has worked loose. A screwdriver will correct the trouble in a jiffy. On the other hand, if the double ghost is a continuous apparition, the shutter blades are too narrow. If the old shutter is non-adjustable, a new shutter with wider blades is required.

The Shutter

When conventional 3-to-1 intermittent movements are used, the blades of fan-type or conical ("dished") shutters should never under any circumstances be narrower than 90 degrees in angular width. (Protractors suitable for the angular measurement may be obtained cheaply at stationery and variety stores.) The 90° width happens to be the theoretical minimum for all 3:1 intermittents. It can be used where sufficient screen illumination poses a serious problem, as in large drive-ins. Wider shutter blades (from 95° to 105°) are required in theatres

* Place a fixed reference marker over any tooth of the intermittent sprocket when at rest. Then slowly turn the projector by the hand-wheel until the second sprocket-tooth from the first (tooth no. 3 when the first tooth is counted as tooth no. 1) comes under the marker. At this point adjust the shutter until one of the blades is in "mid-occultation" position.

where high screen light-levels prevail in order to avoid traces of flickering travel-ghost and a trembling appearance of bright objects in the picture.

The exact blade-width needed in any special case depends not only on the rapidity of the intermittent pulldown of the film, but also on such factors as the rapidity with which the shutter blades move through the light, the width of the light-beam, and the amount of backlash in the gear-train between the intermittent movement and the shutter shaft.

Perfect projection, projection free from the 24-cycles-per-second trembling of the image when the shutter blades are just a trifle too narrow (you'll have to sit down front to see it), demands shutter blades slightly wider than theory calls for. It is always better to have the blades too wide than too narrow; and it is comforting to realize that the slight loss of light occasioned by blades slightly too wide is far too small to be perceptible even to trained observers.

The balancing or "cutoff" blade must be *exactly* the same width as the "master" blade—the one that occults (hides) the film from the projection lens and the screen during the pulldowns. If the cutoff blade were either narrower or wider than the master blade, a terrific 24-cycle flicker would be introduced.

The normal 48-cycle flicker is nearly always perceptible until our eyes get accustomed to it, but it is not definitely troublesome except when picture illumination is excessive.

The fact that the shutter acts with a frequency twice that of the intermittent explains why travel-ghost flickers much worse than the normal picture image. Since the film is pulled down intermittently at the rate of 24 frames per second, the frequency of travel-ghost must likewise be 24 cycles per second—a periodicity too low, especially when illumination levels are high, to avoid the effect of violent flicker.

Framing

The necessity for some means of framing the picture complicates the design of the intermittent-shutter system. The gears driving the intermittent cannot merely be rotated relatively to the shutter driving gear during the frame-shifting or "racking" process without getting the shutter out of time and thus introducing travel-ghost. Every projector mechanism worthy of the name has incorporated, therefore, some means of automatically compensating the shutter rotation whenever the picture is shifted up or down.

Very few projectors, none commonly used in the U.S.A., are so constructed that framing position does not affect the rotational position of the shutter without a compensating device. (One such projector was the Power's. Only a few of these mechanisms can be found in theatres today.)

In one of the most popular types of American projector the picture is framed by rotating the entire geneva intermittent movement around the axis of the sprocket and star-wheel shaft. This causes the entering of the cam-pin into a star-wheel slot to be advanced or retarded. In effect, the intermittent is accelerated or decelerated when framing, even though the actual framing is accomplished by revolving the intermittent sprocket. This arrangement, however, would neither advance nor retard the shutter and its driving gears in their rotation if no compensating rigging were present. The shutter would accordingly creep out of time with the intermittent during framing.

It is to the old Simplex Regular that we owe one of the most compact and serviceable shutter-compensating arrangements ever devised. The intermittent unit is placed in a large cam-ring which turns through the same angular distance as the intermittent sprocket does when the framing knob or lever is manipulated.

The cam-ring works a slide arrangement whereby a *spiral* shutter-drive gear is thrust forward or pulled back on the flat-faced shaft which drives it. Because the shutter-drive gear has spiral teeth, as does the mating gear on the shutter shaft, the sliding movement of the spiral driving gear advances or retards the rotating shutter by the required amount during framing. The pitch of the cam of the cam-ring in which the intermittent movement is held determines the amount of shutter compensation.

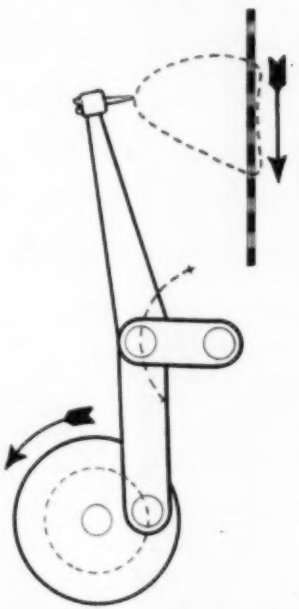

FIG. 2. A 1-to-1 ratio claw movement of Askania make. The hinged lever modifies the action of the revolving cam to impart to the pulldown tooth the characteristic movement indicated by the dotted line. Precise in action, but rough on the sprocket holes, the claw has been relegated to the realm of cameras and 8-mm and 16-mm projectors.

The little shutter-drive spiral gear is mounted in a small box or bracket which is grasped by an arm, or lever, moved by a rod connecting it with the cam-ring. This arm works against a powerful spring. It is this spring that holds the pivoted arm against the connecting rod, and the connecting rod against the cam-ring.

In addition, the pivoted arm which moves the spiral shutter-drive gear in its little box is pivoted on a special *sliding* bracket. This bracket moves only when the shutter timing-knob is turned.

The entire arrangement, which seems complicated when described, is in reality marvelously simple, and serves the dual function of compensating the shutter during framing and permitting the projectionist to time the shutter even while a picture is being projected.

The Simplex Regular was first with this arrangement; and no complaint has ever come to the writer that it has even once failed to work properly. The Super Simplex retained it in original form.

Continuous Projectors

Even though the intermittent-shutter system is the heart and soul of the conventional projector, several attempts have been made to discard this "indispensable" system altogether, delegating its functions to optical compensators. Some of these attempts have actually met with commercial success, although this success was nipped in the bud by certain drawbacks.

Just imagine a workable projector having neither intermittent nor shutter! We can have such a projector provided we are willing to be driven nearly crazy by a complicated system of rotating, revolving, tilting, and vibrating lenses and mirrors which easily gets out of order and cannot be repaired except by highly trained experts at a highly elevated price.

There is no need to go into details here concerning the Mechau, Vig, Holman, and other "continuous" mechanisms. The opinion that the intermittent type of projector is definitely superior in performance to any continuous projector yet devised is practically unanimous.

Types of Intermittents

So many different types of intermittent movements were devised in the later days

(*Continued on page 33*)

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Motiograph Hi-Power Motor-Generators—the most dependable source of direct current for arc lamp service are offered at an unheard-of low price . . . below that of any other generator, and even many rectifiers.

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Continuous Arc Projector Light Meter*

By HARRY P. BRUEGGEMANN

This is a system for monitoring the light output of an arc projector during projection. It comprises a piece of optically flat glass, not silvered, placed in the projector light path, at an angle of 45°, and ahead of the film gate. The light thus thrown off to the side is measured by a photovoltaic light meter.

ARC PROJECTORS are normally built for theater projection, and they are designed to give a picture of pleasing quality. However, when arc projectors are used as laboratory production equipment for timing prints or for side-by-side comparison of prints, they must meet certain rigid specifications. One of these is the maintenance of an absolutely steady light output.

Experience at Cinecolor has been that arc projectors vary in their light output by as much as 20% during a 10-min projection, in spite of good operational practices and frequent equipment maintenance.

This variation, of which the projectionist has no indication, seems to be due to the carbon feed, slight imperfections in the carbons themselves, voltage fluctuations and mechanical variables. A 20% change in light output would probably never be noticed in a theater, provided it is gradual enough. To a timer though, who is attempting to adjust scene densities to within one-half of a printer point of what the producer wants, a change of this magnitude is too great.

Manual Control Feasible

A number of systems for controlling the arcs were investigated. One such system consisted of a photoelectric cell, the output of which would control a thyratron, which in turn would control the carbon-feed motor in such manner as to maintain a constant luminosity. This has the advantage of being automatic, the control being maintained without requiring adjustment by the projectionist. As far as could be determined, there was no such thyratron arc controller on the market, hence it would have to be designed. It was realized that this undertaking would be very expensive. All types of photoelectric light meters were eliminated, also, because of design expense.

The only system which seemed feasible would make use of a photovoltaic cell type of meter so arranged as to keep the projectionist continually informed as to the light output of the projectors. With this guide, he could maintain the light at the standard value by trimming the arc.

* Journal, SMPTE, July, 1952.

FIG. 1. View of the first Cinecolor model mounted in a Simplex projector.

A photovoltaic cell is practical because it maintains its calibration quite well if protected from heat, moisture and intense light. Since a great deal is known about the use of photovoltaic cells as light meters, design of such a system should be relatively simple.

Accordingly, a projector light meter was built around a photovoltaic cell. In order to monitor the light actually reaching the screen, a piece of unsilvered, optically flat glass was placed in the light path at an angle of 45°. This threw a beam of light off to the side of the projector, amounting to approximately 10% of the total output. This was more than enough for any photovoltaic cell, and at the same time caused a loss of only 10% in the screen brightness. This could be compensated for by trimming the arc. Obviously, the glass had to be positioned between the arc and the film gate.

Photocell and Meter

The photocell was a Weston Photronic cell type RR, and the associated ammeter was a 0 to 20 μ-a, 2500-ohm Weston meter. Since the light from the optical flat was far too much for the cell, a means of attenuating this light was necessary.

A dense green glass was placed ahead of the cell in the first model. This cut down the light to a workable level, but permitted a great deal of infrared radiation to be transmitted. This infrared energy raised the temperature of the cell too high for stability, so an Aklo heat glass was added. This promptly cracked. Thus it was evident that another means of reducing the heat was necessary. Ventilation slots were cut into the casting holding the cell, and this helped some, but the Aklo glass still would not stand up.

At this point the projectionists at the MGM laboratory, who had been informed of our project and had built a model of their own, thought of replacing the dense glass filter by a sheet of brass shim stock with pinholes. This solved the excess heat problem, since the infrared radiation was reduced as much as the light. The first Cinecolor model used a bakelite mounted photocell, but MGM used a metal encased cell for conduction cooling. The MGM modifications resulted in a cell mounting which was only slightly warm to the touch, even after many hours of continuous operation.

The Weston microammeter, with its 2500-ohm resistance, gave a fairly linear response when coupled to the type RR Photronic cell. Various devices were considered for improving the linearity, including shunt resistances, lower resistance ammeters, and other types of photo-

(*Continued on page* 10)

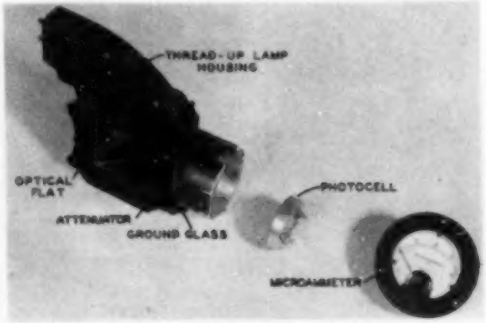

FIGURE 2.

The three basic units of the second Cinecolor model.

AS HISTORY UNROLLS

1922 Russian Republics Form Union

Strong designs the first automatic arc control

1925 Wm. Jennings Bryan and Clarence Darrow Tangle in Scope's Evolution Trial in Tennessee

The first Strong projection arc lamp produced

1928 First All-Talking Picture "Lights of N.Y." Presented July 6, at Strand Theatre, N.Y.

Strong develops the HY-LO projection lamp

1930 Babe Ruth Signs the Biggest Contract in Baseball History, $160,000 for 2 Years

Strong develops the Portable Low Intensity arc lamp

1932 Lindbergh Baby Kidnapped

Strong brings out the A.C. arc lamp

1933 Prohibition Ends in U.S.

Strong develops the Suprex lamp

1935 Hauptmann Found Guilty — Social Security Bill Signed

Strong starts production of reflectors

1936 Edward VIII Abdicates

Strong develops Junior Hi 16mm projection lamp

1938 Howard Hughes Flies Around World in 3 days, 19 hours, 14 mins. Record

Strong develops the One-Kilowatt arc

1948 Gandhi Assassinated

Strong develops the Trouper arc spotlight

1949 Chiang Kai-shek Retires

Strong develops the Mighty "90" projection lamp

1950 Korean Hostilities Begin

Strong develops the Trouperette spotlight

THE *Strong* ELECTRIC CORPORATION

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Big Future Seen for Theatre Tv

THEATRE Tv has a tremendous future—it *"can and will produce big profits"* and moreover "will become an established part of our way of life," Fred C. Matthews, president of Motiograph, told the Kentucky Association of Theatre Owners at a meeting last month in Louisville. However, Matthews stressed, theatre owners must buy and install the video equipment first — before there are enough programs for it and before the transmission facilities are fully adequate. Once theatres are equipped to show Tv suitable and exclusive program material will appear and transmission facilities for bringing it into the theatre will develop. That is the way home Tv grew, Mathews noted; first, people bought receivers, then programs improved and coaxial networks spread.

Matthews' company, Motiograph, is associated with Trad Television Corporation in the production and sale of large-screen (up to 24 feet) theatre video apparatus.

"The installation of theatre Tv," Matthews told his audience, "will not immediately bring old and new patrons to your theatre, nor can you expect immediate profit by such an installation. That's because of the lack of a large number of programs for theatre Tv and the shortage of telephone facilities to bring the programs to you."

Theatre Tv is in the same position that home Tv was, not many years back, Matthews explained; there were few home television sets in the beginning and there were not very many programs. Today home sets number over five million and there are programs in quantity. Some are good, and they will grow better.

As more theatre Tv sets are installed there will be more and better Tv programs exclusively available to them. Good prize fights and important football and basketball games will be available in quantity and Broadway stage shows, opera and ballet will be among the many programs available on an exclusive basis to theatres.

The speaker reminded his audience that programs already have played to large audiences and demonstrated the pulling power of video in the theatre. Walter Reade's St. James Theatre in Asbury Park, N. J., "which has the honor of having the first installation of Trad television equipment," sold out its 1558 seats by 6:00 o'clock on the evening of the Robinson-Turpin fight, Matthews recalled, while a crowd of 2,000 more gathered outside, convincing the management that the house could have been sold out twice over.

Matthews did not deny that prize fights may attract a type of patron who will not come back later to see moving pictures. But, he pointed out, the type of patron that would be attracted to the theatre by a televised showing of "South Pacific" or of any of the great Broadway musicals, comedies or dramas, is the type that would become a permanent customer, for picture shows in addition to Tv. shows.

Theatre television, the owners were reminded, must have programs sufficiently varied to attract all classes of persons. The sports audience is too limited in size.

(*Continued on page* 33)

CONTINUOUS ARC METER

(*Continued from page* 8)

cells; but they all required more light, and consequently would have placed more heat at the photocell. Since heat dissipation was the biggest problem of the project, it was decided to accept the slight non-linearity.

The only advantage to improving the linearity would be to eliminate the scale compression in the operating range and thus increase the sensitivity. With the present model of the meter, however, luminosity fluctuations can be kept within about 3% and this is considered good. Most of this fluctuation is due to the coarseness of the trim, not the accuracy of the meter.

Constructional Details

The location of the unit in the projector is shown in Fig. 1. This view shows the first Cinecolor model mounted in a Simplex projector, just above the framing knob. The rear end of the photocell, showing the bakelite casing, is seen together with the two wires leading to the microammeter. The ammeter is mounted on the wall of the projection booth just below the viewing port, so that the projectionist can see the screen and also watch the meter both at the same time.

Figure 2 shows the three basic units of the second model—the optical flat and brass attenuator mounting, the metal encased photocell, and the microammeter. The optical flat occupies the space normally used by the thread-up lamp when it is lowered for threading up. The lamp was repositioned so that it missed the optical flat when lowered. The perforated brass attenuator slides into a slot cut just ahead of the photocell housing. The edge of this attenuator is visible in the figure. There is a ground glass immediately behind the attenuator to break up the light through the pin holes, and thereby avoid any local "hot spots" on the surface of the photocell. Figure 3 is a schematic drawing of an arc projector with the unit installed.

In operation, the system requires only a 5-minute warm-up period in the morning, after which it will remain constant all day. The warm-up is necessary because the photocell has greater sensitivity when cold, and temperature equilibrium must be reached before the system stabilizes.

During projection, the projectionist need only keep the needle at a constant standard value by appropriately trimming the arc. The use of this system has resulted in a great improvement in projection quality, both at Cinecolor and MGM.

Thanks are expressed by the author to James Phillips, chief projectionist at Cinecolor, for initiating and doing most of the original work in this project; and to MGM's Merle Chamberlain, chief projectionist, and Clayton C. Troxel, Jr., projection engineer, for their modification which contributed to the success of the final model.

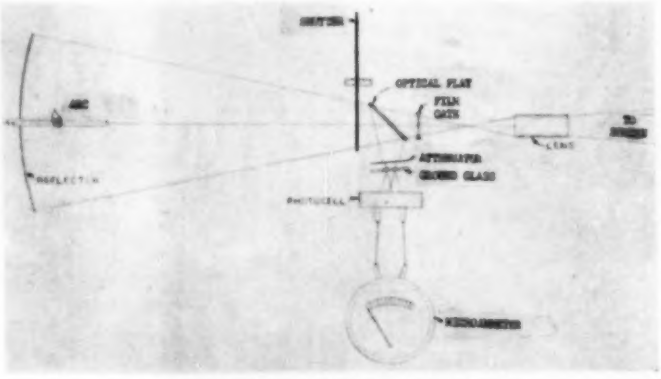

FIG. 3. Schematic of system—top view.

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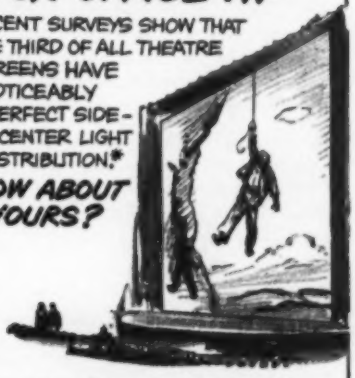

*Report on Screen Brightness Committee Theatre Survey, Journal SMPTE, September, 1951.

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Projecting Television to a Paying Audience

Leo Kane (left) and Paul Mitchell, members of Local 243, operating the Trad-Motiograph Tv controls that put the Robinson-Maxim bout before 1,700 shrieking enthusiasts at the Walter Reade St. James Theatre, Asbury Park, N. J.

"EASY TO OPERATE," is the comment of IA members Leo Kane and Paul Mitchell anent this Trad-Motiograph Tv equipment in their projection room in Asbury Park, New Jersey. They are veterans in its operation, for theirs is the first T-M theatre installation. They were at these same controls nearly a year ago, when their theatre showed the Robinson-Turpin bout to an audience even more turbulent than this year's.

The equipment pictured in the photograph on this page is all there is to the projection room part of the installation. It consists of a monitor unit (which is also the receiver), here shown operated by Mitchell, and a control unit under Kane's fingers. The complete system includes a third element, the Tv projector proper, located in the auditorium and remotely controlled in every detail from this small, six-knob control panel.

In actual operation, the projectionists see and hear the image either on the monitor panel here pictured, or through their regular viewing ports and regular projection room speaker. The monitor panel, which includes the Tv receiver, is tuned in much the same way as any Tv receiver. The control unit includes a changeover provision: the projector proper is of dual-channel construction and in event of mechanical or electrical or optical trouble can be switched over instantly to emergency channel—an operation Leo Kane performed deftly during the Robinson-Maxim showing this June.

"Midway through the fight," a Walter Reade circuit executive tells IP, "the picture flickered a bit and we immediately switched over to the other projection channel. I doubt if the audience realized a change had been made."

This executive adds:

"Projection and reception were completely adequate in all respects, and the boys in the projection room reported no trouble or incidents. Performance was excellent throughout."

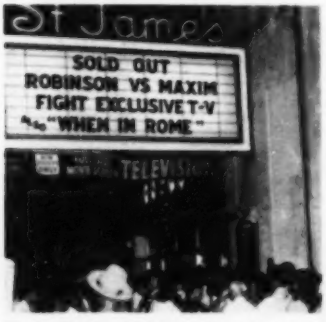
Asbury Park is roughly 50 miles (beeline) from New York City, a resort on the Atlantic Coast. Because of the curvature of the coast straightline transportation except by air does not exist, and the distance is too short for flight. Roads and railroads must curve inward with the coastline. Therefore the trip between Asbury Park and New York takes roughly two hours by railroad and longer than that by either bus or private car. The St. James Theatre there was the closest theatre to Yankee Stadium permitted to show the bout on television.

Transmission was by micro-wave link to Homedel, N. J., a relay point on the Bell Telephone micro-wave trunk; and thence by equalized telephone line to the theatre. Reception was unmarred by "line troubles."

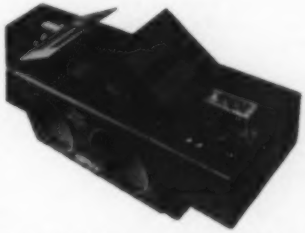
The St. James has 1,558 chairs, roughly 300 in the loges and 1,500 others. Loge seats sold for the bout at $3.60 each; others at $2.40 each, and standees also paid $2.40 each. Owing to fire regulation, only 150 standees were admitted, though thousands applied.

Patrons were predominantly a fight crowd rather than a motion picture audience. Youth and middle age predominated, and not more than one in four was a woman. They reacted like a fight crowd, leaping to their feet, shouting and screaming. Otherwise, however, they were well-behaved, and exhibited none of the disorder encountered during the Robinson-Turpin fight of the previous September, when would-be patrons paid no attention to the fact that the house was sold out but tried to force their way in regardless. On the present occasion the overflow accepted refusal more philosophically. They waited (some thousands of them, it was estimated) outside the theatre, until their

(*Continued on page* 31)



Thousands of would-be patrons, anxious to pay $2.40 to $3.60 each, had to be turned away.



Third and only other unit of the Trad-Motiograph Theatre television system, the dual channel projector, was mounted on the face of the St. James balcony and operated via the control panel in the projection room

Fox Unveils Eidophor, Arc-Lit Color Tv

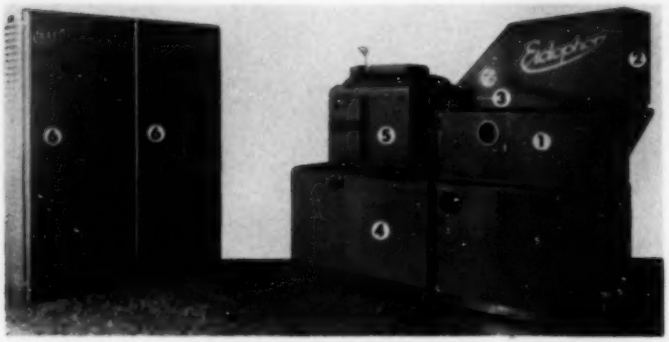


FIG. 1. Item 1 is the projector, containing curved mirror, Eidophor liquid and schlieren optics; Item 2, light beam hood; color wheel is inside Item 3; refrigerator and pump in Item 4; Item 5 is the Ventarc; Item 6 cabinets contain the Tv receiving and power circuits.

ARC-LAMP screen brightness and full color feature the Eidophor system of television. This system, demonstrated by Twentieth Century-Fox in New York at the end of June, uses an arc lamp instead of a cathode ray tube to form the image. The particular lamp used in the New York demonstrations was the Ventarc H. I. Carbon "Blown" Arc described in IP for July, 1950 (Page 13). Like the Eidophor itself, the Ventarc is of foreign invention. At the New York showings it was operated at 125 amperes to illuminate a 15-foot screen.

Color is added to Eidophor television by the Columbia Broadcasting System's "field sequential" color-wheel system.

Figure 1 shows a complete Eidophor system (single projector). The system consists of two units—the cabinets at the left of Figure 1 and the projector assembly at the right. The cabinets contain the regular television receiving and power circuits, which are essentially conventional. The projector set-up includes the Ventarc, the projector proper in front the Ventarc, and the two cabinets on which the lamp and the projector rest, which contain needed auxiliary apparatus.

Principle of Operation

To understand the general principle of operation of the Eidophor theatre Tv consider Figures 2 and 3. In Figure 2, assume that a source of light is located at the left of the figure, and that beams of light enter the figure through the "schlieren" slits between bars *a, b, c, etc.* The light is intercepted by the lens and focussed upon the right-hand bars *a', b', etc.* The arrangement is such that no light emerges at the right-hand side of Figure 2, since the image of each slit on the left (through which light enters) is focussed by the lens upon a bar at the right.

A similar arrangement exists in Figure 3 but a small prism has been added at *N*. Light passing through *N* is deflected from its original direction and therefore it does emerge at the right, where it traverses a second lens and is focussed upon a screen.

If a television signal could be used to create and obliterate prisms such as *N*, the arrangement of Figure 3, if placed in the path of an arc light, could reproduce television images. This is the way the image is formed in the Eidophor system.

Figure 4 is a schematic of the Eidophor optics. At left, Item No. 1 is the Ventarc. The light beam passes through the rectangular aperture, Item No. 2, which gives the proper 3-to-4 rectangular shape. Thence the beam traverses the color wheel, and a lens, Item No. 4. The schlieren bar-and-slit assembly is Item No. 5 and is one of the improvements in the present Eidophor over the larger and cruder model, now abandoned, which was based on Figures 2 and 3. In each of those figures (which are presented here only to illustrate a principle) there are two sets of bars and slits—one at left and one at right. But in Figure 4, Item No. 5 is made to fulfill the function of both sets. This is accomplished by putting mirror surfaces on the left side of the bars. The optical action in Figure 4 is as follows:

Optics of the System

Light emerging from Item No. 4 touches upon the bar and slit assembly. Half passes through the slits and is lost. (This loss corresponds to the shutter light-loss of a conventional projector.) The other half strikes the mirror surfaces of the bars and is reflected downward to the spherical mirror, Item No. 7. In a condition corresponding to that of Figure 2 this light is thrown back by the spherical mirror to the mirror bars, and by them back to the arc.

But in a condition corresponding to that of Figure 3 a portion of the light, on being reflected upward by the spherical mirror, is so deflected that it passes between the bars and thus to Item No. 10. Item No. 10 is a projection lens, Item No. 11 a mirror and Item No. 12 the theatre screen. Thus the theatre screen

(*Continued on page* 17)

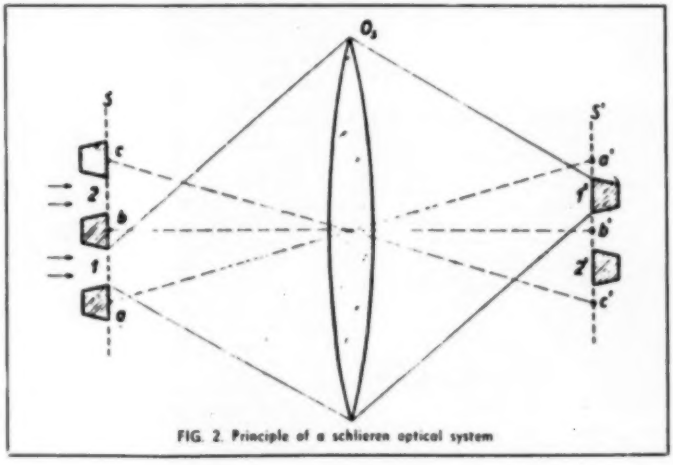
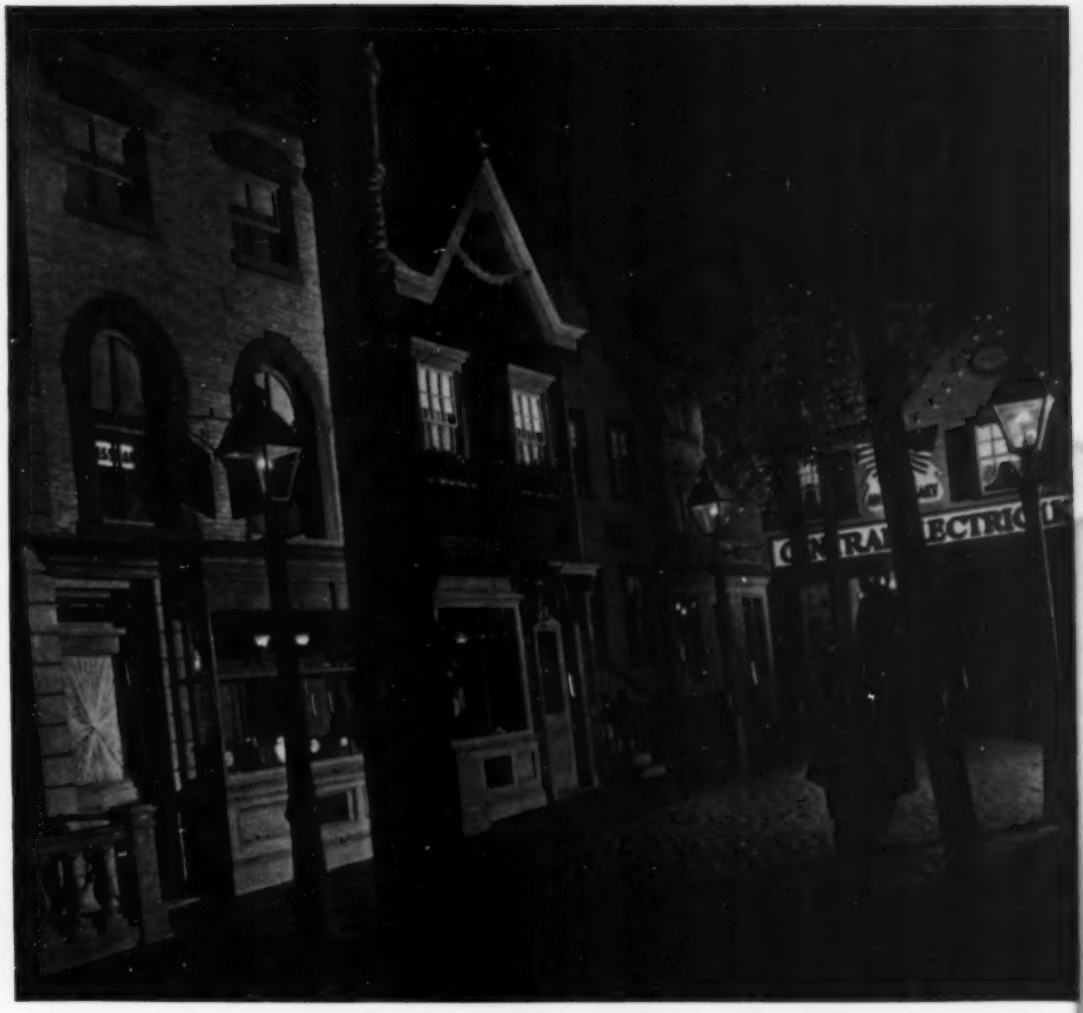


FIG. 2. Principle of a schlieren optical system



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FOX UNVEILS EIDOPHOR, ARC-LIT COLOR TV

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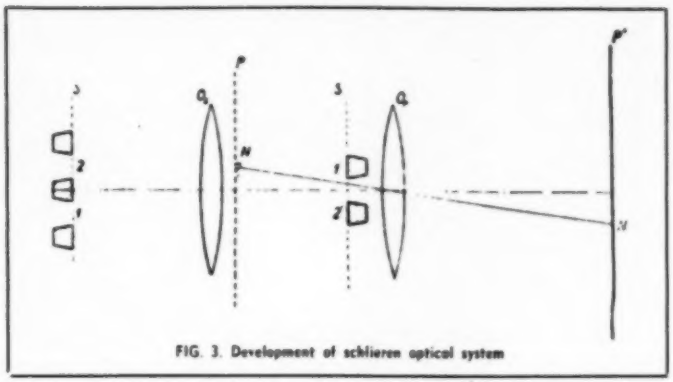

FIG. 3. Development of schlieren optical system

is illuminated whenever an equivalent of the prism, *N*, of Figure 3, is interposed in the light path of Figure 4. Such equivalent prisms must be created by a television signal if the theatre screen is to display a television image.

"Prisms" In Oil

Item No. 6 of Figure 4 is an electron gun, entirely similar in general principle to the electron gun inside any Tv picture tube. A beam of electrons is created, focussed and deflected in the normal way, and modulated by a Tv signal. This beam scans the area, Item No. 8, of Figure 4. This is, of course, the illuminated area, the bright rectangle of light corresponding in shape to the aperture, Item No. 2.

Now here is the heart and secret of the Eidophor system:

The surface of Item No. 7, the sperical mirror, is coated with a thin layer of oily liquid. It is this liquid surface that is bombarded by the electron beam; it wrinkles up into a wavy surface when bombarded and in proportion to the bombardment. Where the image is dark there is no bombardment; the surface of the oil remains smooth; the light is reflected to the mirror surfaces of the schlieren bars and returned by them to the lamp; the theatre screen remains dark. But where there is light in the Tv image the oil surface is temporarily covered with wavelets that correspond optically to Prism N in Figure 3; light from these wave-surfaces is reflected to the spaces *between* the mirror bars and this light does reach the theatre screen. The intensity of each light-dot on the screen depends on the height of the wavelet, which in turn depends on the intensity of the electron bombardment —which in turn is controlled by the strength of the Tv signal at that instant.

Other details of this method of modulating the light of an arc lamp to produce a Tv image are discussed below; at this point it might be well to complete the formation of the screen image by tracing the addition color to it.

The image structure is conventional, 525 lines, interlaced. It is formed in the conventional way; the electron beam traces Lnes 1, 3, 5, etc., and then goes back to interlace between them lines 2, 4, 6 and so on. One frame is complete when the interlacing is completed; half a frame (consisting only of the odd-numbered lines, or only of the even-numbered lines) is called a field.

Color Mechanism

Each field, by reason of the synchronized color wheels on the Tv camera and Tv projector, is seen by the camera and shown by the projector in one color only. The sequence of fields in the three primary colors is merged by the eye into a full-color picture. This "field sequential" system of providing Tv color is of course not "compatible" with the "line sequential" or "dot sequential" methods; and is also not "compatible" with conventional black and white Tv.

Equipment Details

To return to the details of the projector. Three important details remain to be examined.

First: it will be remembered that the oily liquid on the surface of the spherical mirror bunches itself up into wavelets (or more accurately, "pimples") under electron bombardment. But each wavelet or pimple must subside again into a flat surface before the electron beam passes that way on its next scan of the surface. The time of subsidence depends on the viscosity of the liquid, which is very carefully compounded to possess exactly the desired degree of viscosity. But viscosity changes with temperature; and this liquid is being bombarded not only by an electron beam but also, by the light and heat of the Ventarc. Hence refrigeration is necessary. The temperature requirements are not too critical, but they exist and must be met. A refrigerator unit is installed in the cabinet under the arc lamp.

The liquid not only accumulates heat, which must be neutralized by refrigeration; it also accumulates electrical charges as a result of the cathode ray bombardment. To enable these charges to leak off the liquid is made electrically conductive by addition to the oil of unspecified substances. The electrical conductivity thus imparted to the liquid, however, is not very great; the charges do not leak off completely in the time necessary; therefore the spherical mirror is made to revolve as the arrowhead in Figure 4 shows. As the mirror revolves, the liquid passes under a knife-edge, Item No. 9, which smooths out the last remaining traces of wrinkling and provides the desired level surface.

(*Continued on page 30*)

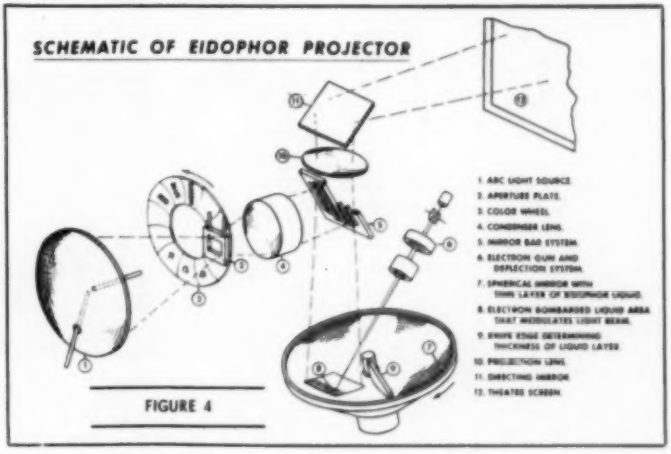
SCHEMATIC OF EIDOPHOR PROJECTOR
1. ARC LIGHT SOURCE.
2. APERTURE PLATE.
3. COLOR WHEEL.
4. CONDENSER LENS.
5. MIRROR BAR SYSTEM.
6. ELECTRON GUN AND DEFLECTION SYSTEM.
7. SPHERICAL MIRROR WITH THIN LAYER OF EIDOPHOR LIQUID.
8. ELECTRON BOMBARDED LIQUID AREA THAT MODULATES LIGHT BEAM.
9. KNIFE EDGE DETERMINING THICKNESS OF LIQUID LAYER.
10. PROJECTION LENS.
11. DIRECTING MIRROR.
12. THEATRE SCREEN.

FIGURE 4

IN THE
SPOTLIGHT

AS THIS issue goes to press some thousands of IP readers are checking their reservations and getting ready to pack their bags for the 41st IA Convention, which will be held in Minneapolis the week beginning August 4. A record-breaking attendance is expected, and the various IA Local Unions in Minneapolis have organized a committee headed by William Donnelly (Local 13), chairman, and Al Kuiper (Local 219), co-chairman, to make the delegates' visit as pleasant as possible.

This 41st IA Convention can be expected to produce top-level labor statesmanship, for it has difficult problems to face—the combination of threat and opportunity offered by Tv being only one. These problems will be faced and dealt with adequately, for the IA has proved before that it is capable of developing labor statesmanship of the highest order.

• The Rhode Island State Federation of Labor will hold its 52nd annual convention at the Narragansett Hotel, Providence, R. I., October 4-5 next.

• William Cart, business representative for Local 712, Owensboro-Henderson, Ky., was recently elected treasurer of the Owensboro Central Labor Union.

• Five members of the IATSE were elected vice-presidents of the Union Label Trades Department, AF of L, at the New York State Convention which was held in Rochester, N. Y., May 15-17. They are Joseph R. Vecchio, Sr., Rochester Local 253; H. Paul Shay, secretary, District No. 10; Thomas Murtha, Brooklyn Local 4; William H. Maxton, Syracuse Local 376, and Earl Tuttle, Binghamton Local 396.

• A threatened move to bar film workers from unemployment insurance when out of work is being fought by the Hollywood AF of L Film Council. The Council, which represents 25,000 workers in the motion picture industry on the West Coast, has called on all organized labor in the state of California to help combat this threat. The Council contends that a special commission appointed by California's governor is expected to recommend to the legislature changes in the wording of the State's Unemployment Act. It is said that the industry workers would not be named in the proposed recommendation but that by a change in the eligibility wording they would be barred from unemployment benefits.

• The Minnesota State Federation of Labor has set up a scholarship program at the University of Minnesota for the children of trade union members. Sons and daughters of members of trade unions affiliated with the Minnesota Federation for at least three years are eligible. Applicants must have grade averages during the senior year of B or better.

• The Tri State Ass'n, which is comprised of IATSE Local Unions in western Pennsylvania, W. Virginia, and Ohio, held its 28th annual convention last month in Pittsburgh, Penna. More than 150 delegates and guests attended the banquet and business sessions. IA President Richard F. Walsh made the principal address. Paul P. Mach, president of Pittsburgh Local 171 opened the program.

• James V. Sipe, business representative for Local 171 was elected secretary-treasurer of the Association to succeed the late F. P. McCoy, whose death was reported in these columns last month.

• John Diehl, member of Boston Local 182, is now chief mate on the *S. S. Union Sulphur*, a merchant marine vessel running from New York to the West Coast. Diehl was formerly chief projectionist at the Scollay Square Theatre in the heart of Boston, and when the theatre was shuttered several months ago he returned to his old love—the merchant marine.

• Orin M. Jacobson, 8th IA vice-president, member of Tacoma Local 175, has been called in to settle the differences between the distributors and film exchange Locals B-71 and 72.

• For the past 22 years, Larry Shafer, member of Cleveland Local 160, has played a prominent role in the activities of the "160" Bowling League. Back in 1930 he conceived the idea of forming a bowling league among the members of the Cleveland Local. This quickly "caught on" with the members and today the "160" teams, which are generally sponsored by dealers and manufacturers of motion picture equipment, are rated high in bowling circles. The teams roll weekly from October to May and often compete with each other.

A highlight of the bowling season is a ten-game match between the Local 160 teams and the Nightingale Club of Detroit Local 199. This is usually followed by a banquet at which prizes are awarded to winners of the various events.

The present officers of the "160" League are A. T. Smart, president, and Larry Shafer, secretary.

25 Years Ago—July, 1927

• The General Executive Board held its midsummer meeting at IA headquarters, 1440 Broadway, New York City. . . . Assistant IA President Harry Dignam entered the hospital for surgery. IA Representative L. Krouse took over pending Dignam's absence from the office. . . . The Union Labor Life Insurance Co., owned and controlled by organized labor,

CLEVELAND LOCAL 160 BOWLERS WIN 1951-1952 CHAMPIONSHIP

Sponsored by National Theatre Supply Co.'s Cleveland branch, these members of the "160" Bowling League won the 1951-1952 bowling championship by winning 57 out of 78 games. The winning players shown here are, left to right: Floyd Weber, Joe Buzek, Andy Zill, captain; Fred Lane, and Ed Hutchins. A 10-game match with Detroit's Local 199 featured their season.

TORONTO LOCAL 173 RECREATION CLUB AWARDS TROPHY TO BOWLING CHAMPIONS

Arthur Milligan (third from left), business representative, is shown presenting the Local 173 bowling trophy to James Farrah, captain of the winning team. Smiling their approval are (left to right): R. Curry, H. Jarmain, Milligan, Farrah, E. Cooke, and, W. Hulse.

formally opened its offices in Washington, D. C. . . . Warning was issued against an imposter giving the name of Emery J. Lesser, who claimed to be a Fox cameraman and a member of Philadelphia Local 307. He presented a phony card to the secretary of Local 396, Binghamton, N. Y., and requested his assistance in cashing a check. Fortunately, his request was refused and a wire from Local 307 confirmed the suspicion that this man was not a member of the Local and was an imposter. The real Emery J. Lesser was a responsible business man from Warren, Penna., and was a member of Warren Local 296. . . . IA President Canavan granted permission to Local 617, Greenville, Miss., to appeal to IA Local Unions for financial assistance to help relieve the distress suffered by its membership in the recent flood disaster.

• P. A. McGuire, friend of projectionists everywhere, and author of the slogan "Better Projection Pays," phoned his old friends at IP recently and we had a

IPC's Enthusiast for Better Projection, P. A. McGuire

pleasant chat rehashing old times. Although 77 years old and long retired from his active duties with International Projector Corp., Mac sounded as chipper and sparkling as ever—an old soldier who refuses to fade away.

• Local Unions are a valuable cog in the success or failure of the 1952 voter registration drive by labor organizations. This is the opinion expressed by the officers of Labor's League for Political Education. Among the recommendations made by LLPE officials for conducting a voter registration campaign is one suggesting that the rolls of a Local Union be checked against the city registration records. It would then be a simple matter to find out which trade unionists are registered voters.

• Speaking of bowling, the Toronto Projectionists Recreation Club of Local 173, recently wound up its activities of the season with its third annual banquet and dance. More than 150 members and their wives attended the affair, which was highlighted by the presentation of the 1952 Local 173 trophy to the captain of the winning team, James Farrah.

• The New York State Association will hold its 40th anniversary celebration on the 16th of this month at the Moose Club, Rochester, N. Y. Elaborate plans have been formulated to make this one of the outstanding affairs of the Association.

• The horse drawn by Solly Cohen, member of Toronto Local 173, in the recent Irish Sweepstakes romped home with the bacon and Cohen today is richer by $140,000. We understand that he has had rather phenomenal luck in picking winners in three successive sweepstakes—in two of them the horses he picked were scratched and he won $500; in the third he was one of the four big winners.

• The Michigan Alliance, IATSE, held its quarterly meeting last month at the Labor Temple in Detroit, Mich.

IA-IP Amateur Radio Bulletins

By AMOS KANAGA, W6BAA

Secretary, Local 409, San Mateo, Calif.

BELIEVE me, fellows, no one of you could have received more of a kick than I did out of the terrific increase in our IA-IP Ham Listings that the big spread showed in the May issue of IP. We keep a pretty doggone accurate record of you fellows in a big grey loose-leaf book, (it used to be a small folder) and while I was cognizant that we had a big increase, seeing it actually in print . . . WOW!

The list is really something, but now that we have successfully under way the very popular IA-IP Achievement Awards in the "Worked 10 IA-IP" and the prized "GOLD AWARD Worked 25 IA-IP," we really are busy. Thanks again to IP and President Dick Walsh, the certificates are now rolling along in fine order—practically no delay when your log of IA stations worked is received. (See May issue of IP for all data.)

Now that IP has graciously conceded a monthly column for us, let's not forget that it takes YOU radio men to supply the material to keep this alive.

Amongst our gang are quite a few who are handling Far East GI traffic, regular relayed messages and phone patch. Well, some of the IA gang on the West Coast need several Eastern relay points to pass the stuff along; as you all know the way the bands are, it's almost impossible to push it directly through from far Pacific, Japan etc. We have a rather unique set-up with several

NEW IA-IP 'HAM' LISTINGS

W1GR	Al Hyde—L. 223
W1GND	Wilbur Tracy—L. 437
W4JIC	Chet Ruffner—L. 264
W5IBI	William Armstrong—L. 183
W5PBA	Hulon Byrne—L. 540
W6MBD	Harry M. Leonard—L. 695
W6VSP	Everett Brown—L. 695
W6COF	Harold Steck—L. 695
W6RGJ	Don Fay—L. 695
W6UMZ	John Steurhoff—L. 159
W6FMG	Fred Kienle—L. 165
W6KP	Ollie Garretson—L. 695
W6EJH	Jack F. Lilly—L. 695
W7HIZ	Fred Olson—L. 255
W7KBD	Earl Tosland—L. 180
W7COZ	Leslie Cowan—L. 446
W8ZNO	Ken Rowe—L. 776
WøSWM	Earl Leonard—L. 695
VE3BZJ	L. R. "Slim" Kilbourne—L. 622
VE3DFK	F. Barkey—L. 173

IA-IP "BOX SCORE"

"Worked 10 IA-IP"

#1	W4PKT	Marion Sanders	Loc. 507
#2	W1BVB	Don Fancher	Loc. 439
#3	W6BAA	Amos Kanaga	Loc. 409
#4	VE7ALW	Merle Wilson	Loc. 348
#5	W6PFF	Frank Champlain	Loc. 150
#6	W6FOP	George Abrams	Loc. 297
#7	W6MU	A. Houston Barnett	Loc. 695
#8	W◎GSW	James Evans	Loc. 242

"Worked 25 IA-IP"

#1	W6PFF	Frank Champlain	Loc. 150
#2	W6MU	A. Houston Barnett	Loc. 695
#3	W6BAA	Amos Kanaga	Loc. 409
#4	W6DDQ	Phillip Wisdom	Loc. 695
#5	VE7ALW	Merle Wilson	Loc. 348

Note: If your call and name does not appear this month log received too late to verify. Send all log copies to W6BAA Amos Kanaga 262 La Casa Avenue, San Mateo, California.

of the boys in the deal, where we take the actual voice of the GI and tape-record it, playing it back to the Eastern "W" station which phone patches it to the family. Of course this is only "one way" but they sure get a kick out of hearing the GI's voice. Naturally there is plenty of regular traffic too, so those of you who can spare some time let us know. If you are tied up with CD or Red Cross be sure and pass that along as well.

Award Contest Hot

You will notice quite a few more Achievement Award winners in the box this month and if yours is applied for and not there yet, don't worry, it will be next time.

Here and there: W6PFF OM Frank Champlain of Local 150 is in a dead heat with the gang to see who will work the MOST IA fellows this year . . . yep, the secret is out, we are going to try and promote some really nice prizes for the top three. . . . We wish you luck, Frank, but take a look at the Gold Award winners, W6MU Houston Barnett of Local 695; W6DDQ Phil Wisdom also of 695 . . . and don't underrate those "Worked ten" Chaps, you should see the "additions" they are shooting in. Any day brings surprises and the last guy you would think comes through with a new big list of IA men worked. You Doug, W7AXY of Local 91 in wild Idaho, if you ever came through with a complete log . . . well. And I hate to admit it, but you VE's and other districts than W6 are really starting to cut into the W6 gang on IA QSO's . . . well, keep it up!

Dashes and Dots

Congrats to W8IG Frank Riley of Local 160 in getting his old original two letter call back; and VE3BZJ Slim Kilbourne Local 622 along with VE3DFK Barkey of Local 173, we are glad to finally have you with us . . . now get those awards!

Ten A.M. Pacific Daylite Time Mondays is QST and ragchew time on about 28,700 and if ten dead 14,270 . . . as ten is perking up on short and medium skip the IA-IP General calls can be resumed. The IA boys are co-operating on the ten meter propagation tests this summer so join the gang for the tests and ragchews. On 75 any night after midnite look around 3950 for the gang.

We have more to chew over than other hams who are not united by such ties as common IA membership or common craft interest. In addition to comparing our ham rigs we can—and some of us do—compare the booth equipment we work with at times when the need to satisfy the tax collector draws us reluctantly away from the airwaves.

73 for now fellows and anything you want to know drop us a line . . . or give us a call over the air.

To the Editor of IP:

The question I have in mind pertains to the proper threading number to use when threading a reel into a projection-machine. I have come across projectionists who use various footage numbers and when asked why that number in particular answer they have used it for years and just continue to do so.

I realize it all depends on how fast the motor picks up speed to attain the normal speed of 24 frames per second, but I have noticed projectionists varying the footage number when threading the same machine.

Therefore, would appreciate the proper threading point which should be used with the Simplex X-L, Simplex E-7 and Brenkert projectors. Also, was there ever established a definite footage number to thread on regardless of the type of projector?

Here in these post theatres projectors used are Simplex E-7 and Super Simplex and the footage used to thread is nine, or in some cases a chance is taken on ten. Sometimes the changeover that follows is perfect, but this will not happen at all times, which leads me to believe the cue marks are not always properly printed into the film.

SGT. HARRY F. FLIDER
Camp Carson, Colo.

P. S. Has IP ever made a survey to determine which projectors and arc lamps are best in operation, durability, economy and preference of projectionists?

Ed. note: The Army and Air Force "Projectionist's Manual" states: "The starting point will depend on the starting speed of the machine . . . will usually be near the 8- or 9-foot mark on the standard leader . . . The location of this point must be determined by trial . . . when no audience is present." These Army instructions are, of course, identical with civilian practice.

There cannot be any "definite footage number to thread on regardless of the type of projector used." The threading requirement will vary not only with the make of projector but also with its age and condition; and in some cases even with temperature. It is possible that your trouble may lie in variable starting time of your projectors rather than in the film. You might check this possibility with a stopwatch. As for the cue marks not being properly printed on the film, you can easily determine that: according to American Standard Z22.55-1947 (IP for May, 1952, Page 6) the last motor cue mark and first changeover cue mark should be exactly 10 feet and 12 frames apart.

IP has never made the survey you suggest to determine which makes and models of equipment are "best" because that would be a matter of opinion only. A survey of the preference of projectionists would be meaningless because few of them have had the opportunity of extensive experience with all makes and models.

To the Editor of IP:

Anent the current controversy* over masked and maskless screens it would seem that the question of unmasking a screen should not arise in a theatre unless it is planned to integrate the entire front of the house into a suitable sur-

(Continued on page 32)

16-mm

BECAUSE EXPANSION OF 16-mm ACTIVITY PROVIDES INCREASING FIELDS OF EMPLOYMENT FOR SKILLED PROFESSIONAL PROJECTIONISTS IN TV STUDIOS AND NON-THEATRICAL SHOWINGS, AS WELL AS ENHANCED POSSIBILITIES OF PERSONAL BUSINESS VENTURES, THIS NEW DEPARTMENT OF IP WILL APPEAR MONTHLY HEREAFTER.

Bell & Howell 202 Series Projectors

Continuing IP's review of the outstanding characteristics of modern 16-mm magneto-optical mechanisms.

FILMOSOUND 202 is the trade-name given a series of sound projector mechanisms by Bell & Howell Company, all of which are generally similar and adequately represented by the accompanying photographs. There are different models in the series—for example, model 202-C has a built-in (but removable) 6-inch loudspeaker while model 202-B has a 12-inch speaker in a second carrying case. Some speakers are equipped with a "Cordomatic Unit"—spring-controlled speaker cord reel. Filmosound 202-B3 and 202-B6 models each have a 25-watt audio amplifier in the speaker carrying case. Accessories also vary; and include several types microphones, a disc record player, projector pedestal, series of lenses and etc.

Basically, however, the 202 projector is the mechanism pictured in Figure 1. Film passes through the mechanism from the upper reel to the take-up reel at the rear (left). Film path is shown on the threading-guide diagram on the inside of the open door. The incandescent projection lamp is inside the ribbed vertical cylinder toward the rear of the mechanism. The amplifier is at bottom, center; when it is removed for servicing the mechanism is laid over on its (non-operating) side; and the amplifier, its holding screws having been removed, is pulled out through the bottom.

In Figure 1 simple maintenance equipment can be seen inside the open door—lubricating oil, film path brush, and spare fuses. An extra take-up belt is also standard spare equipment.

A hand microphone can be seen resting on the table just behind the projector (under the take-up reel) in the same illustration. Because of the ease of magnetic recording on properly stripped 16-mm film, microphones are widely used with modern magneto-optical 16-mm mechanisms—in fact, the possibility of using them to create and edit soundtracks at will is one of the main advantages of these new 16-mm projectors.

These Filmosound 202's will: (*a*) project silent 16-mm film; (*b*) project and play sound optical track 16-mm film; (*c*) project and play sound magnetic track 16-mm film; (*d*) erase existing sound from magnetic track film; (*e*) record new sound track on erased magnetic track film; (*f*) serve as a film recorder (without pictures) by recording and playing back magnetic tracks, and (*g*) serve as a public address system to play magnetic tracks or (with suitable accessories) disc records or microphone speech.

Wide Range of Usefulness

A device of such versatility evidently must have a very wide range of uses. The addition of magnetic sound to 16-mm equipments has contributed greatly to increase their usefulness and expand the whole field of 16-mm operations.

Sales films on 16-mm have long been known; but with magnetic in addition to optical track, with the former erasable and alterable at will, the sales representative can alter his verbal presentation to match the nature of his audience. For example, at a convention of his own company's salesmen or dealers he can record a pep talk on the track; for an audience of customers, a sales talk, and so on.

In educational or religious work dealing with children the identical picture presentation can be accompanied by a specially-recorded track (perhaps made by the teacher only a few minutes before the showing) in which explanatory or lecture material accompanying the pictures is adapted to age or previous preparation of the class.

In the "half-track" 16-mm prints the magnetic strip, the sound of which can be erased, edited or replaced as desired, covers only half the optical track (which of course is unchangeable). With such prints, the user can play either the unalterable original optical track or the revised, edited, magnetic one, according to the nature of the audience and needs of the occasion.

The usefulness of such arrangements, in comparison with the older 16-mm sound films which were no more editable than a theatre's regular 35-mm prints, is obvious.

Figure 2 presents a close-up of some of the simple control arrangements. Hidden behind the hand-held microphone in Figure 2 are two toggle switches. These can be seen in Figure 1. The left switch controls the power to the projection lamp; the one at the right is the AC line switch. All other controls are more plainly seen in Figure 2.

The "direction" switch, directly above the microphone in Figure 2, reverses the film direction; at the opposite side of the projection lamp base is the speed switch that provides a choice between 16 frames-

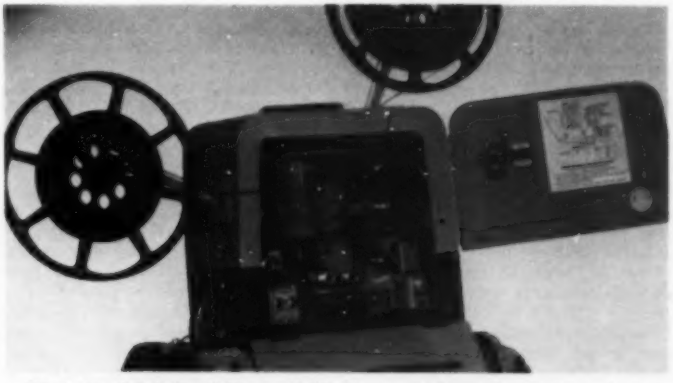

FIG. 1. The Bell & Howell Filmosound 202 16-mm optical-magnetic recording projector.

per-second (silent) and 24 fps (sound) speeds.

To the right again and somewhat below the speed switch are the magneto-optical "sound control" and locking levers. The former is indicated in the illustration by a printed call-out but is not plainly visible. The latter is not indicated but readily visible—it extends downward just to the left of the designation "MAG.".

Mechanical choice between magnetic and optical operation is afforded by the sound control lever and its associated locking lever; the corresponding electrical choice is provided by the double knob on the amplifier panel immediately below. The inner, or sound selector, knob can be set in any of three positions: magnetically record, magnetically play and optically play. The outer knob on the same shaft controls microphone volume when recording. The volume control used during playing is left of this; the recording level indicator light at extreme left of the amplifier panel.

At extreme right of the amplifier panel are two jacks; the lower for external microphone (shown in use) and the upper (shown not in use) for external phonograph. Microphone and phono sound can be mixed, phono volume being controlled by the volume control on the record player.

Record-Erase Devices

To right of the amplifier panel in Figure 2 and on the same level with it, are the record indicator light and record button (shown with finger pressing it). These devices relate only to magnetic recording (the only kind of which the mechanism is capable; it can neither photograph nor develop optical tracks). In magnetic recording, the track on which sound is to be placed must first be cleared of all accidental or intentional magnetism and presented completely and totally demagnetized ("clean") to the magnetic recorder. For this purpose it is passed through a magnetic eraser—a flux field of super-audible frequency. (A watch that has been accidentally magnetized is restored to usefulness by similar treatment). This necessary ability of the mechanism to erase magnetic tracks might by accident or through meddling destroy irreplaceable recorded material. Hence precautions are built in: the record-erasing facility will not function unless the "record" button is pressed, and the "record" light warns when it is functioning. If for any reason the mechanism is stopped or reversed an automatic interlock disconnects the recording-erase facility and it will then not function again until the "record" button is once more deliberately pressed.

(A further protection against accidental erasure of magnetic records is an accessory unit, a record-erase lock and cap. The cap fits over the record button and has an ordinary lock and key. When it is locked in place no one can touch the record button until the holder of the key comes along and unlocks and removes it.)

The exciter lamp is located inside the unit shown just above the "record" button and light unit in Figure 2.

The photoelectric cell is mounted in a socket at the front-right corner of the amplifier. Exciter light passing through the soundtrack is deflected to the photocell along the inside of the film drum.

An instruction book accompanying the equipment gives complete information on the detail of setting it up for operation, plugging in the line power and speaker cables (when the latter is necessary); setting the reels and reel arms in place, and such similar processes necessary to put the mechanism into operation. Manipulation of all controls for projection, for sound from optical track, sound from magnetic track, recording magnetic track, and use of the equipment as a public amplifier system, is explained in the instruction book at adequate length and often with help of thoroughly informative illustrations. Figure 2 is a type of the illustrations provided; there are approximately 23 others equally detailed and labelled.

The operation and elementary maintenance of the Bell & Howell Sound Projector for 16-mm film can also be learned from 16-mm film! There is an instructional sound reel giving very detailed information which can be rented from International Film Bureau of 57 E. Jackson Boulevard, Chicago 4. This print shows a projectionist setting up, adjusting, operating, readjusting, lubricating, cleaning and otherwise maintaining a Bell & Howell 16-mm mechanism.

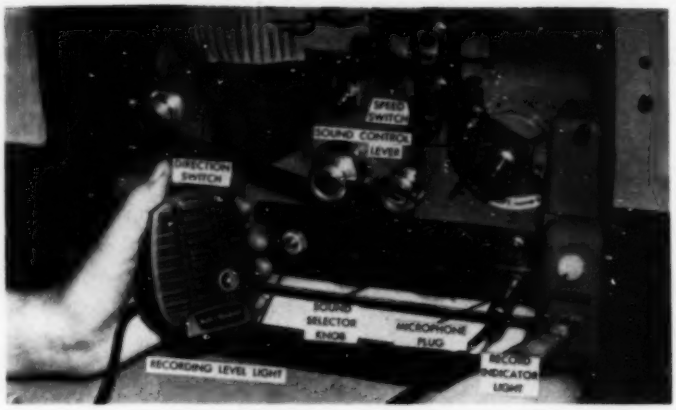

FIG. 2. Close-up view of the principal operating controls and microphone of the Bell & Howell Filmosound 202 16-mm optical-magnetic recording projector.

Maintenance instructions given in that film, or in the B. & H. instruction book, do not, however, go into very great detail. The instruction book shows (with illustrations) how to remove the amplifier so tubes (including the pec) can be replaced; but does not deal with any other amplifier repairs nor even provide a schematic.

Opening the gate for cleaning, replacing the projection lamp; lubricating; replacing belts, pilot lights, exciter lamp, fuses, amplifier tubes and pec—these procedures plus a lens table substantially exhaust the maintenance instructions supplied by the manufacturer. No data on replacing mechanically worn parts, for example, (other than replacing belts) is included; just as there is none on repairing amplifier faults other than defective tubes. The Bell & Howell policy in such matters is explained by their Department of Public Relations in relation to the "Lifetime Guarantee" under which their products are sold; this guarantee is void "If equipment has been serviced by other than a B. and H. authorized service station."

New Pamphlet on 16-mm Projectors

RCA offers a new 12-page illustrated pamphlet describing the Model "400" Senior and Junior 16-mm sound film projectors. Cartoons and animated line cuts are used to explain outstanding design features of the mechanisms. The pamphlet, one of several recently issued to advertise RCA technical products, can be obtained by writing to the Visual Products Section, RCA Victor, Camden, N. J., and asking for form 2R-8305.

New Catalog of 16-mm Films

Bailey Films, Inc., has issued a new 52-page catalog of 16-mm films available for rental. Free copies can be obtained by writing the company at 6509 De Longpre Avenue, Hollywood 28, Calif.

Accepted Standards for 16-mm Projection*

Standards exist and are necessary in the 16-mm projection field as well as in 35-mm. Some of the 16-mm standards of practical interest to projectionists are presented here.

STANDARDS are as necessary in 16-mm as in 35-mm projection. Films of every origin must be capable of running on any projector. The sprocket holes must fit the sprockets, the soundtrack must run through the path of the exciting light; the shape of the frame on the print must correspond to the shape of the aperture in the machine, etc. In fact the film width, 16-mm, is itself a standard.

These standards, like those for 35-mm, are often developed by the Society of Motion Picture and Television Engineers for approval by the American Standards Association, and are used by film manufacturers and equipment manufacturers as specifications to which both film and equipment must conform.

The work of standardization is far from complete, and never will be completed as long as improvements are made and new devices invented, since these too often need to be standardized. As an example, at this time, when magnetic sound on 16-mm film is still very new, there are as yet no accepted standards either for the placement of the magnetic track, or for its width, or for the quality of its sound. Work is being done on this problem; in due time standards will be drawn up, discussed, modified, tried, criticized, altered and eventually accepted. When that has been accomplished every magnetic-track 16-mm print will be playable on every 16-mm projector and will produce approximately the same quality of sound in every case.

Sixteen-mm standards that have been through the mill and gained acceptance in the past are the ones presented here.

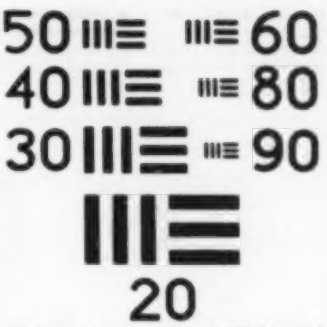

FIG. 1. Resolution test pattern (x 100 diameters)

Method of Determining Resolving Power of 16-mm Projector Lenses (Z22.53-1946)

1. Scope and Purpose

1.1 This standard describes a method of determining the resolving power of projection lenses used in 16-mm motion picture projectors. The resolving power shall be measured in lines per millimeter.

2. Test Method

2.1 The lens to be tested shall be mounted in a special test projector. A glass plate test object, carrying patterns of lines, shall be then projected upon a white matte grainless screen located at such a distance from the projector that the projected image of the border of the test object measures 30 x 40 inches. The resolving power of the lens is the largest number of lines per millimeter in the test object pattern that an observer standing close to the screen sees definitely resolved in both the radial and tangential directions. Lines shall not be regarded as definitely resolved unless the number of lines in the image is the same as the number of lines in the test object.

2.1.1 The patterns of lines shall consist of parallel black lines $2.5/X$ mm long and $0.5/X$ mm wide with a clear space $0.5/X$ mm wide between the parallel lines, where X equals the number of lines per millimeter.

2.2 Care shall be taken to insure that the screen is perpendicular to the projection axis and that the lens is so focused that the image of the center of the test plate is as sharp as possible.

3. Test Projector

3.1 The projector design shall be such that the glass plate test object is held in proper relation to the lens axis. It shall not heat the test plate to a temperature which may cause the plate to be fractured or otherwise damaged. The cone of light supplied by the projector shall completely fill the projection lens.

4. Test Object

4.1 The glass photographic plate used for making the test object and the lens used in making the reduction of the master test chart shall have sufficiently high resolving power to insure clear definition of all lines in the patterns on the test object.

4.2 The photographic reduction of the master test chart shall be such that the test object border has a height of 7.21 mm (0.284 inch) and a width of 9.65 mm (0.380 inch) with a radius of 0.5 mm (0.02 inch) in the corners, and such that the sets of lines in the reduced image are spaced 20, 30, 40, 50, 60, 80, and 90 lines per millimeter.

4.3 The patterns on the test object shall be in accordance with Fig. 1.

4.4 The position of the test patterns on the

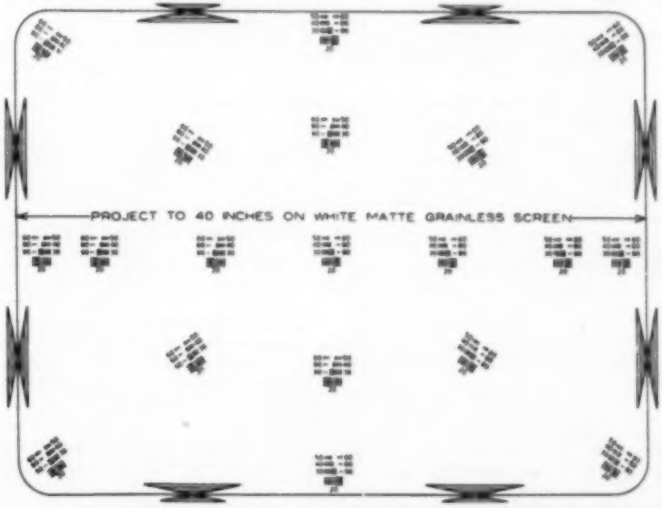

FIG. 2. Resolving power test object (x approximately 15 diameters). The triangular edge patterns are to facilitate alignment of test plates in the projector.

* American Standards Association

test object shall be in accordance with Fig. 2.

4.5 Identification of the positions of the test patterns on the test object shall be in accordance with Fig. 3.

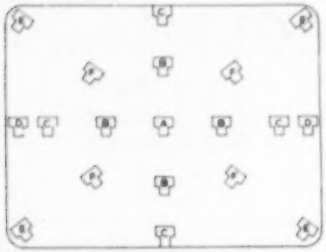

FIG. 3. Identification of test patterns in frame area. When using a 2-inch focal length lens, B corresponds to 2 degrees from the axis; C corresponds to 4 degrees from the axis; D to 5 degrees from the axis; E to 6 degrees from the axis, and F to 3 degrees from the axis.

3000-Cycle Flutter Test Film (Z22.43-1946)

1. Scope and Purpose

1.1 This specification describes a 3000-cycle sound test film for use in determining the presence of flutter in 16-mm sound motion picture projectors.

2. Test Film

2.1 *Recording.* The test film shall have either an originally recorded, direct-playback positive variable-area sound track or an originally recorded variable-density sound track developed as a toe record. The recorded frequency shall be within ± 25 cycles of the nominal 3000-cycle frequency. The modulation of the recording shall be 80 ± 5 percent. The output level of the film shall be constant within ± ¼ db. (This is equivalent to an amplitude tolerance of ± 0.0015 inch when recording variable-area sound track with a nominal amplitude of 0.055 inch.) The recording shall be accomplished in a recorder so constructed as to keep the flutter content to the absolute minimum consistent with the state of the art. The total rms flutter content of the film shall be less than 0.1 percent upon shipment by the test film manufacturer. The wave-form distortion of the recording shall not exceed 5 percent.

2.2 *Film Stock.* The film stock used for the test film shall be cut and perforated in accordance with the American Standard 16-Mm Sound Motion Picture Film; Cutting and Perforating for Negative and Positive Raw Stock, Z22.12-1941, or latest revision thereof.

2.2.1 *Resistance to Shrinkage.* The film stock used for the test film shall have a maximum lengthwise shrinkage of 0.50 percent when tested as follows: At least 20 strips of film approximately 31 inches in length shall be cut for measurement of shrinkage. After normal development and drying (not over +80 F [+26.7 C], the strips shall be placed at least ¼ inch apart in racks and kept for seven days in an oven maintained at +120 F (+49 C) and a relative humidity of 20 percent. The strips shall then be removed, reconditioned thoroughly to 50 percent relative humidity at +70 F (+21.1 C), and the shrinkage measured by an adaptation of the pin-gage method outlined in Research Paper RP-1051 of the National Bureau of Standards. The percent shrinkage shall then be calculated on the basis of deviation from the nominal dimension for the length of 100 consecutive perforation intervals given in American Standard Z22.12-1941, or latest revision thereof.

2.3 *Standard Length of Film.* The standard length of the flutter test film shall be 380 feet.

2.4 *Leader and Trailer.* Each test film shall be furnished with a suitable leader, title, and trailer.

(TO BE CONTINUED)

Magnetic Sound on Old Prints

Magnetic soundtracks can be stripped onto old single-perforation, 16-mm Kodak prints, Kodachrome or black-and-white, silent or sound, Eastman Kodak Company announces. The service is available immediately. In the case of sound prints the magnetic strip can be applied either over half the width of the optical soundtrack or over the entire track, as desired. The magnetic coating can be stripped onto prints photographed at either sound or silent speed. It is always applied to the side of the film toward the projector lamp.

There is, of course, no sound in these magnetic tracks; the owner of the print records his own. Sixteen-mm projectors capable of playing magnetic tracks are also equipped to record sound on them. (A source of sound — microphone or record-player — must be plugged in at the appropriate point.

Charge for applying magnetic track to existing 16-mm prints is 3½ cents per foot, minimum order $10. The service is available through all Kodak dealers. It does not at present apply to double-perforated 16-mm film but may be extended to such stock in the future if demand warrants.

New 16-mm Curtain Control

A new curtain control and track, intended primarily for 16-mm showings, is announced by Automatic Devices Company, well known as manufacturers of theatre-size curtain equipment. The new 16-mm track, trade-named Spanorama, is available in either aluminum or magnesium. Construction follows the principle used in ADC theatre equipment of balanced rubber wheels rolling on parallel treads. Ball bearing sheaves at either end of the track and in the floor pulley facilitate curtain action.

For hand operation, Spanorama can be supplied twenty-foot lengths. For curtain openings not larger than 16 feet an electric operator, trade-named Tom Thumb, is available to control curtains at the touch of a button.

New Modified RCA 16-mm Unit

Jim Gallagher, president, Gallagher Films, Inc.

Modified by Gallagher Films, Inc., for arc illumination, dual mechanism projection, and other conveniences, the equipment here pictured embodies essentially an RCA Senior mechanism, Strong 30-ampere lamp and rectifier, and RCA amplifier and permanent magnet speaker.

Use of a 30-ampere arc in place of an incandescent lamp makes possible a brighter and larger screen image. The amplifier is modified for operation from two sound sources (for changeover) and is physically rearranged to fit in a metal cabinet as pictured, rather than in the carrying case in which it is otherwise supplied; the circuits are essentially unmodified, however, and standard RCA schematics may be used in servicing. The speaker, rated at 25 watts, has a 2½ pound permanent magnet, and is supplied in a carrying case designed for operation with the rear closed, to improve acoustic loading.

The quadruped base is not essential; rubber feet on the tilt-base of the projector-lamphouse mount protect any underlying support and permit use of the equipment even on fine furniture, Gallagher Films explains.

The power derived from any ordinary AC outline is said to be adequate to operate the entire assemblage, including the rectifier that supplies d.c. to the Strong arc lamp.

Repair parts and service data are supplied only via RCA theatre equipment dealers with approval of the RCA visual products distributor.

RCA Color Tv to FCC Again

RCA has notified FCC it intends to apply shortly for permission to test color Tv in the New York metropolitan area during commercial telecasting hours.

Such tests were banned in 1950, when the Federal Communications Commission gave its official nod to the rival color method of Columbia Broadcasting System.

The CBS "field sequential" color system is not "compatible"—that is, such telecasts cannot be received on ordinary home equipment, but only on home receivers built or modified to respond to field sequential signals. RCA's "line sequential" color Tv on the other hand is "compatible"—it will appear, on an ordinary, unmodified home receiver, as an ordinary black-and-white picture.

The renewed application for testing it during commercial telecasting hours foreshadows, in the opinion of persons conversant with the field, a possible new attempt by RCA to induce FCC to reverse or modify its previous decision in favor of the CBS method.

Meanwhile, construction of home receivers for color-video remains under restrictions imposed by the National Production Authority while construction of similar equipment for theatre use is not restricted any longer.

Theatre Color Tv Ban Lifted

"All the prohibitions previously in effect as to the manufacture of color television equipment except those relating to home-type color television" are lifted by the National Production Authority's June 24th amendment to NPA Order M-90. Home-type receivers designed for color television, and products, attachments and parts for home reception of color TV, remain under restrictions.

Altec in Oklahoma City

Altec Service Corp. is opening an office at 706 West Grand Ave., Oklahoma City, Okla. C. J. Zern, Southwestern division manager, is in charge, assisted by branch managers J. R. Brown and George LeBlanc. H. M. Bessey, Altec executive vice president, announced the development.

Hornstein, St. Louis, Sold

Joe Hornstein, Inc., motion picture theatre supply house in St. Louis, Mo., has been sold to J. W. Shreve and Paul McCarty of Shreve Theatre Supply Co., of Kansas City, Mo., and is being operated by its new owners under the name McCarty Theatre Supply Co.

Drive-In Theatre Mfg. Co. Moves

Drive-In-Theatre Mfg. Co. has moved from its former address in Kansas City, Mo., to 505 West 9th Street in the same city, to secure more room for expanded facilities.

more B.A.*

*(BOXOFFICE APPEAL)

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Brooklyn 11, New York

PERSONAL NOTES

EDWARD STANKO has been appointed to the newly-created post of manager of engineering, technical products section, RCA Service Company. The appointment was announced by W. L. JONES, the company's vice president in charge of technical products. Stanko joined RCA in 1920 as a ship's radio operator; changed over to radio broadcasting; is believed to have been the nation's first disc jockey (in Buffalo, in 1927); demonstrated "scanning disc" television in Buffalo in 1928, and rejoined RCA Manufacturing Company as theatre sound engineer in 1937. He is an active radio "ham", operating station W2RHT from his home in Haddon Heights, N. J.

Appointments of J. WINTON LEMAN as manager of Eastman Kodak's photo press division, of KENDRICK O. RICHARDSON as manager of the photofinishing and school division, and ALVIN W. STREITMATTER as manager of the professional photographic division, are announced by JAMES E. MCGHEE, vice president and general manager.

ROY N. SACKETT, who retired from Eastman Kodak's motion picture film department on February 1, 1951, died last June 20 at the age of 68. He has been with Kodak since 1906 and was widely known, particularly in the Midwest and South. Surviving are his wife, daughter and three grandchildren.

KALMAN SPELLETICH, JR. (SPEC), has been appointed assistant sales manager for Victor Animatograph Corporation, Victor's president, SAM G. ROSE, announces. Spelletich served as Victor sales representative in 1946 and for some years thereafter; for the past two years he has been sales representative for DeVry Corporation. His new duties include supervision of domestic and foreign sales of Victor 16-mm projectors and their new Magnasound recording attachments.

Kalman Spelletich, Jr., now assistant sales manager for Victor Animatograph Corp.

P. M. BUHRER and C. O. KLEINSMITH have been named executive vice presidents of National Carbon Company by its president, A. S. JOHNSON. Both have been with the company many years. Buhrer was graduated by Johns Hopkins with his B.S. in chemistry in 1923 and has been with National Carbon ever since, serving in their research laboratories, and thereafter as head of product and process engineering, product manager and assistant general manager. Kleinsmith joined National Carbon in 1914, and (with time out for military service during World War I) has been with them since, with headquarters in Dallas, Atlanta and New York. For many years he has been general sales manager in charge of consumer goods, and has been a vice-president since 1944.

C. O. Kleinsmith (left) and P. M. Buhrer

New Name for Camera Exchange

Dumont's 34th Street Camera Exchange is the new name of the photographic supply store at 150 East 34th Street, New York City. "Dumont" has been prefixed to the previous designation owing to acquisition of an interest by Harold A. Dumont. No change of address or policy has been announced.

Canada TV Sales Down

Canadians are buying fewer television receivers. In the first three months of 1952 they spent 6.9 million dollars for 13.5 thousand sets. In the same period of 1951 Canadians bought 14.0 thousand receivers at an expenditure of 7.6 million dollars.

Fortunate, indeed, are the theatre operators whose projectors are powered by Hertner Transverters, noted for long, trouble-free life—many of which have been used continually for three decades.

Restrictions imposed by the defense effort may prevent present improvement of your power conversion problem, but now is a time to make the decision to change at the first opportunity to better and more economical equipment that provides *direct current at constant amperes at the proper voltage*—a feature of the Hertner motor-generator Transverters.

Plan now to profit by the same kind of service and economy enjoyed by thousands of satisfied theatre users.

For a complete description of the six types of Hertner Transverters — a model for every requirement — ask for Bulletin No. 301 and keep it in your "Future Improvements" file.

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MOTORS • MOTOR GENERATORS • GENERATOR SETS

BOOK REVIEW

TELEVISION ENGINEERING, by Donald G. Fink, 6½ x 9, 721 *pages, abundantly illustrated, indexed, cloth. McGraw-Hill Book Company, Inc., New York, Toronto, London,* 1952. $8.50.

Although it is the second edition of a work that has been standard in the Tv field since 1940, the present volume is substantially a new book throughout. Of the original 540 pages, 505 have been rewritten and 200 more added. The author, Donald Fink, is editor of *Electronics;* Fellow, Institute of Radio Engineers; Fellow, American Institute of Electrical Engineers; Vice-Chairman, National Television System Committee.

He provides an engineering (as distinguished from rigorously scientific) view of his intricate subject. His mathematical presentations (which are held to a minimum) are offered in the relatively simple final equations that guide the practical engineer and designer, avoiding the more complex theoretical derivations.

Schematic circuit diagrams and system block diagrams, photographs, and explanatory charts and graphs, are abundant. Textual presentation is as clear and simple as the nature of the subject matter permits—comparatively speaking, easy reading. The book is not, however, for the absolute beginner. The author does not take time out to explain vacuum tube action, amplification, nor elementary radio principles like modulation and demodulation; it is taken for granted that such matters are reasonably well known to the reader; attention is concentrated on details peculiar to Tv technology.

The entire field of television is covered, from camera to final image. The chapter headings indicate the scope of coverage: 1. The Television System; 2. Analysis and Synthesis of Images; 3. Cameras and Picture Tubes; 4. Scanning and Synchronization Methods; 5. Transmission of the Video Signal; 6. Video Amplification; 7. Carrier Transmission of Picture and Sound Signals; 8. Color Fundamentals; 9. Color Television Systems; 10. Television Broadcasting Equipment; 11. Television Receiving Equipment.

There is no extensive treatment of theatre television, however. Projection methods in general are touched on only briefly. The Schmidt optical system is diagrammed and explained in about one page of text. The Scophony light-valve theatre arc-lamp projector is described, with two geometric diagrams explanatory of its operation, on two additional pages. One page is devoted to film-intermediate theatre Tv, with a picture of the installation at the New York Paramount theatre. The North American Philips "lobby" projection system that produced images up 4 feet wide, is glanced at. Eidophor Tv is not mentioned. The special projector pull-down and shutter arrangements commonly used to scan 24-frame motion picture film at the 30-frame-per-second rate of television are described, and diagrammed, in connection with Tv broadcasting equipment.

To IP readers with strong electronic background—for example, readers of the IA-IP ham group and those with similar interests or attainments—who may wish to add to their mental equipment a well-rounded basic acquaintance with video technology, *Television Engineering* is strongly recommended. And it is recommended to all practicing projectionists of reasonable electronic background who have or expect to have Tv equipment in their responsibility, and want to know more about the circuit details, the what and the wherefore of the apparatus.

New 3-Speed Non-Synch Turntable

A new three-speed playback turntable suited to use for theatre curtain music and other entertainment purposes has been announced by Fairchild Recording Equipment Corp. Instant shifting to any of the three standard speeds (33.3, 45 and 78.26) is provided. Stable speed is attained within the first revolution, mechanical noise is rated 55db below reference level, mechanical vibration is filtered and further reduced by spring mounting. Turntable is 16" in diameter, driving motor 1/20 hp.

Up Use of Technicolor

Three-fourths of all their 1952-1953 productions will be in Technicolor, an increase of fifty percent over their use of Technicolor in 1951-1952, Universal-International announces.

Enjoy the Hospitality

and See the Display

of

The STRONG ELECTRIC CORPORATION

at the IATSE Convention

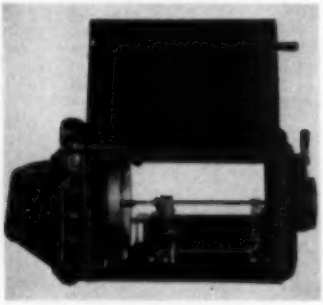
August 4-8--Parlor F

Hotel Nicollet ● Minneapolis, Minn.

When the lamps are STRONG the picture is bright!

RCA Brings Out Water-Cooled Arc

BURNING 70 to 90 amperes, this new arc lamp just announced by RCA has a water-cooled positive and delivers a rated output of 18,000 lumens. Economical operation and very stable performance are among the claims made for it. Stability of performance is promoted



RCA High-Intensity arc lamp.

by an exceptionally elaborate magnet system that produces interlaced, cooperative magnetic fields at the flame location, stabilizing the flame.

The new lamp has been trade-named RCA Hy-Arc. Its trim is 9-mm x 20" high intensity positive and 5/16" x 9" negative. The reflector is 15 inches in diameter. Cool operation is promoted by the roominess of the interior. Cleaning and maintenance are facilitated by absence of any obstructions on the floor of the lamp. Controls are arranged vertically at the right side rear. Drive mechanisms, wiring and associated apparatus details are mounted on the left side of the base and protected against heat by suitable covers. Rotating parts are journaled on ball bearings or needle bearings.

A rest or guide for the negative carbon to prevent imperfect alignment is mounted to the negative carriage frame by means of heavy insulated castings.

The non-rotating positive carbon is trimmed through a water-cooled loop that is mounted close to the crater and is claimed to keep the positive head cool under all circumstances.

Magnet stabilization is effected by interacting fields. One magnetic loop, in the form of an inverted letter *U*, is located on the water jacket and energized both by current flow and by induction. Additionally, a row of electromagnets is located behind the lower part of the reflector. The one at extreme right can be seen in the illustration. Attached to the end of its core and extending upward is a steel projection. This projection, together with another like it on the opposite side of the lamp, function to center the field of these electromagnets approximately in line with the optical center of the lamp, and with the center of the flux field produced by the U loop on the water jacket. These interlacing fields of force produce the degree of stability desired and effectively prevent any tendency toward flame envelopment of the positive carbon, RCA claims.

The Hy-Arc is intended for indoor and medium-sized drive-in theatres. It is distributed through RCA equipment dealers.

Color TV Patents Total 229

A total of 229 patents have been granted by the United States Patent Office for inventions relating to color television exclusively, according to Patent Service Institute, which issues a list of them. Earliest color TV patent on the list is dated October, 1912. The latest shown was issued in August, 1951. Those interested can obtain the complete list from the Institute, 945 Pennsylvania Avenue, N. W., Washington, for a small fee. The individual patents listed can be bought from the Patent Office at 25 cents each or consulted at any large public library.

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Big, bright, razor-sharp images on your theatre screen still beat all other types of entertainment competition. B&L Super Cinephor Lenses let you show today's fine films at their brilliant best... keep your patrons coming back! Complete series of lenses... for intimate theatre to mammoth drive-in.

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Motion Picture Industry Expands While Grosses Drop

THE U.S. motion picture industry has attracted additional investment, its advertising has increased, its capacity is greater, but attendance is down and grosses are down, according to figures presented in the just-published 1952 *Film Daily Yearbook*. In Canada, to the contrary, admissions and grosses are up. Figures in the 1952 *Yearbook* apply to 1951; and those in the 1951 edition to 1950. Thus, the comparison is between the years 1950 and 1951.

Capital invested in the entire U. S. motion picture industry is estimated at $2,931.7 millions, an increase of $9.1 million over 1950. Of this, investment in the theatre end of the industry is estimated at $2,745 millions, an increase of $5 millions over 1950.

On film advertising the industry spent, in the U. S., an estimated $68.25 millions in 1951 as against an estimated $66.75 in 1950.

Grosses and Attendance

Yet, grosses and attendance were down. The 1951 gross take (federal and state taxes excluded) was $1,278 millions, a drop of 3 percent from 1950's $1,320 millions. (All-time peak gross was $1,565 millions in 1947.) Attendance was down 10%, to an estimated 54 million weekly, against 1950's estimated 60 million weekly. (All-time peak estimated attendance was 90 million weekly in 1930, 1946, 1947 and 1948.)

Some discrepancy in figures is apparent in the fact that a 10 percent decline in attendance resulting in only a three percent decline in gross admissions necessarily indicates that the price of the individual admission must have increased; however, the *Yearbook* finds no such increase but sees total admission cost to the patron (including all taxes) at 52.8 cents in both years—an all-time high. In this connection, however, *Variety*, on June 18th, estimated the average motion picture admission at fractionally over 46 cents. (Lowest average admission cost in twenty years is 23 cents—in 1933, 1934, 1937, 1938 and 1939.)

Projection Rooms Increase

Theatres in the U. S. are fewer, yet because of drive-ins actual entertainment capacity is greater. Also, there are more, not fewer, projection rooms, again because of drive-ins. The number of theatres declined in 1951, as compared with 1950, from 19,796 to 19,048, a loss of 748. But drive-ins increased from 3,323 to 4,151, a gain of 828. Thus there were 80 projection rooms more in the U. S. in 1951 than in 1950.

Entertainment capacity also increased. *Seats* declined from 12,384,150 to 11,977,081, a loss of 407,069. But the 828 new drive-ins must have much more than made up for the difference. Although their capacity is not given, other studies in recent years have indicated that the average modern drive-in has a capacity of 400 to 500 cars; and if each car is rated as containing a potential five seats, the average seating capacity of the drive-in is roughly 2,000. Therefore 828 of them would seat 1,656,000—abundant compensation for the loss of 407,069 indoor chairs.

Yet despite this increased capacity, despite increased advertising and investment, business was down as noted.

Canada's Theatres Prosper

Expenses, of course, were up. Every industry's costs, like every individual's, reflect inflation. Craft labor in Hollywood studios, for example, was paid $76.032 millions in 1951 as against $67.622 millions in 1950. These figures were obtained by the *Yearbook* from California State Department of Industrial Relations. Estimated *theatre* payrolls, however, show no change, but are judged by the *Yearbook* to have been $201.42 millions in each year.

In Canada, admissions increased from 245.02 millions to an estimated 269.5 millions; and grosses from $86.713 millions to an estimated $95 millions; both gains being of the order of 10 percent.

And while the number of indoor theatres in the U. S. declined, from 19,796 to 19,048 (the peak was in 1929, with 23,344) the total number of indoor theatres in the whole world increased, from 95,155 to 96,070.

Eastman Kodak Pays

Eastman Kodak Company paid its 200th quarterly dividend on July 1st. The company has not missed a common stock dividend since 1893.

SPLICES NOT HOLDING?

Film breaks are costly. Play safe by using

JEFRONA
All-purpose CEMENT

Has greater adhesive qualities. Don't take our word for it. Send for FREE sample and judge for yourself.

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EQUIPMENT & SUPPLIES
For EVERY Theatre Need!
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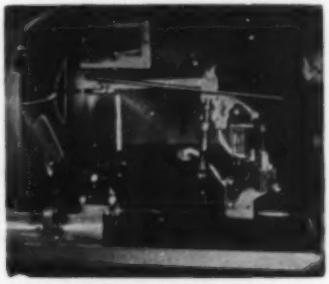
SAVE 22% ON CARBONS!

The CRON-O-MATIC Fully Automatic Carbon Saver

Uses positive carbon stubs of any length, without preparation, and without affecting regular operation of the lamp. When entirely consumed, the new carbon goes into use without losing the light.



Burning average lengths (3½") down to ¾" saves 2½" or 22.2% of the carbon cost.

SAVES THE AVERAGE THEATRE $400.00 A YEAR

No more guessing whether a carbon will burn a full reel.

Adaptable to Ashcraft "D" and "B", Brenkert-Enarc, Peerless Magnarc and Strong Mogul lamps.

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( ) Please send literature on the Cron-O-Matic
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Theatre
Street
City & State
EXPORT: Fraser & Hansen, Ltd.
San Francisco, New York, Los Angeles

FOX UNVEILS EIDOPHOR

(*Continued from page 17*)

The electron gun, Item No. 6 of Figure 4, necessarily must function in a vacuum—gas in the path of the beam would become charged by the electrons and would scatter the beam. Every Tv picture tube of course encloses a vacuum in which its electron beam operates. But conventional tubes can be, and are, exhausted and sealed off in the factory. The Eidophor vacuum cannot be secured in the factory because it contains within itself a liquid that is the heart and secret of the whole operation and that will most infallibly tend to evaporate. The only way to maintain a vacuum in the Eidophor system (in spite of evaporation of the liquid) is to keep it continuously on a vacuum pump. A suitable pump is, accordingly, installed under the arc lamp alongside the refrigerating unit.

Results Obtained

Operation of the Eidophor does not appear to present any exceptional difficulties. Maintenance requirements include periodic replacement of the oily liquid (which is removed by degrees by action of the vacuum pump). How often the electron gun may need to be replaced experience will show. It does not use an oxide-coated cathode—which would be chemically destroyed by the oil vapors—but one of pure tungsten. This is heated partly by radiation from a surrounding helix, and partly by electronic bombardment from this helix, which for that purpose is given a charge that is powerfully negative with respect to the cathode.

As demonstrated in New York the Eidophor reproduced a variety show staged two city blocks away and transmitted by equalized telephone line. The image filled a 15-foot screen; was bright and clear with good color and excellent definition; and of such quality that it was mistaken by some observers for a Technicolor film.

GOLDE SPOTLIGHT STOPS TRAFFIC!

Long-life GoldE spotlights brighten lobbies, displays, etc. U. L. Approved. Easiest to set up, most compact. Instant-lock tilt, heat-proof lens, porcelain sockets, asbestos cord, removable cast base. Two models—500 watts, 1000 watts blower-cooled. Pipe clamps, color wheels, color frames available. See your dealer—or write us—

GOLDE MANUFACTURING CO.
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New Rear Projection Lenses

Rear projection lenses that effect side-to-side reversal of the image without auxiliary optics and simultaneously eliminate "hot spot" have been announced by Par Products Corporation of Hollywood.

How the side-to-side reversal is achieved in the lens is not disclosed at present for reasons connected with patent law; similarly, the manufacturer cannot now reveal the patent-applied-for feature which is said to produce 90 percent center-to-side distribution of light. These data will be given to IP—and by IP to its readers—whenever the patent situation permits.

New Par Vertar 35-mm rear projection lens

The lenses were originally developed for Fanchon and Marco's rear projection theatre in St. Louis.

The 35-mm model is built for a projection throw only 1.4 times the picture width; it is of 1.2 inch equivalent focal length and rated at aperture ratio f/2.0. The 16-mm model is rated at f/1.5, equivalent focal length 0.6 inch, projection throw 1.5 times picture width. The lenses are sealed against oil and moisture and normally need not be disassembled for cleaning.

Unite to Preserve Industry's Past

Museum of Modern Art's Film Library in New York City and George Eastman House of Photography in Rochester have united their efforts to locate, acquire, study, preserve and exhibit films that are milestones in the history of the industry. Their combined collections at present include nearly every outstanding motion picture produced since the Edison and Lumiere films of 1894. These are interchanged, used in different forms of study, and exhibited from time to time to individual students, film societies, and members of this industry. Nelson Rockefeller, for the Museum, and O. N. Solbert, for George Eastman House, announced the latest agreement on cooperation between the two groups.

ANSWER TO YOUR TECHNICAL PROBLEMS...

The Altec Service Man

The Altec Service Man and the organization behind him

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PROTECTING THE THEATRE—FIRST PLACE IN ENTERTAINMENT

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Made in U. S. A. by
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IA ELECTIONS

LOCAL 415, TUCSON, ARIZ.

Albert D. Runkle, *pres.*; A. J. Denny, *vice-pres.*; E. E. Mitterling, *sec.-treas.*; B. M. Osuna, *rec.-sec.*; George G. Codd, *bus. rep.*; G. E. Martinez, R. Yrigoyen, *exec. board*; E. S. Munoz, *guardian*; G. G. Codd, del. *IA Convention.*

LOCAL 509, DULUTH, MINN.

George Olson, *pres.*; Edgar Chubbuck, *vice-pres.*; Ernest Poling, *fin.-sec.*; William Call, *rec.-sec.*; Fred Danielco, *treas.*; Harold Olson, *bus. rep.*; James Milne, James B. Enochs, *exec. board*; J. Enochs, *wage scale comm.*; Walter Quick, *sgt.-at-arms*; H. Olson, *del. IA Convention.*

LOCAL 712, OWENSBORO-HENDERSON, KY.

William Drury, *pres.*; Carl Pullen, *vice-pres.*; Earl Hardin, *sec.*; William Stewart, *treas.*; William Cart, *bus. rep.*; W. Cart, *del. IA Convention*; Norman Brown, W. Cart, *del. Central Labor Union.*

Eastman House Open All Summer

George Eastman House in Rochester, N. Y., and the associated free film programs at Dryden Theatre in the same city, will continue open to the public all summer. George Eastman House is chartered by the University of the State of New York as a non-profit educational institute. Except Mondays, it is open without charge daily 10:00 am to 5:00 pm. Its exhibits include the whole history of photography, plus fine art collected by George Eastman throughout the world. The Dryden Theatre film programs are scheduled for 3:30 pm Saturdays and 2:30 and 4:00 pm Sundays. Ample free parking space is provided.

Larger Quarters for GoldE

GoldE Manufacturing Company, makers of equipment and accessory items for both 35-mm and 16-mm projection, have moved their offices and plant to new and larger quarters at 4808 N. Clark Street, Chicago 40. Increasing consumer demand plus expanded company activity in development of new products made the change necessary, President E. W. Goldberg explains.

PROJECTING TELEVISION

(*Continued from page* 13)

luckier friends within emerged to tell the story.

Projection room portions of the T-M theatre television system contain, as already indicated, only receiving, tuning and controlling apparatus and circuits. Projection apparatus and circuits, including all the high voltage power supply circuits, are built into the projection unit which is mounted in the auditorium and operates without direct human supervision, by remote control from the projection room.

The projection unit is pictured herewith. The two circular openings on its face are its two projection ports. Inside each port is a Tv picture tube on which the image is formed, and a modified Schmidt optical system that projects the image to the theatre screen. These constitute the dual-channel projector. Electronic circuits and apparatus necessary to the functioning of the two tubes (including all high voltage circuits) are in the two wings which are shown in this illustration with their tops hinged open for servicing—in all normal operation the tops are kept rigidly closed.

Photographers Convene in New York

The Photographic Society of America has scheduled its 1952 convention for August 12th to 16th, at the New Yorker Hotel in New York City. Non-members as well as members of the Society are welcome to attend and are accorded all convention privileges on payment of the regular registration fees. Detailed information anent the convention program and activities can be obtained from the Society, 2005 Walnut Street, Philadelphia 3; or from J. A. Bernstein, Chairman of the 1952 PSA Convention Publicity Committee, 80 Madison Avenue, New York.

PICTURES UNSTEADY ?
No. E-78-L
Removable Film Gate
If your intermittent is in good condition and you are experiencing trouble in picture steadiness—look to your film gate. The New LaVezzi Film Gate with its longer pads and centrally located conical compression springs exert just the right tension to eliminate unsteadiness—is gentler on the film—and the intermittent. See this gate at your dealer or write for further information.
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You Can't Buy
A GOOD
Rectifier
for Less!
Strong Rectifiers are the only rectifiers on the market which are especially designed, manufactured and tested in one plant together with and for use with motion picture projection arc lamps. This is highly important, as efficient operation of each type and rating of arc necessitates a rectifier specifically engineered to its particular requirements.
There is a dependable Strong Rectifier for every type projection lamp: 2-Tube • 4-Tube • 6-Tube • Single and Three Phase Models for
• Rotating Feed Angular Trim High Intensity
• Copper Coated Coaxial High Intensity
• 1 K.W. High Intensity
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All assure smooth output current, long life, low operating temperature, and flexibility in control.
WRITE FOR LITERATURE OR FREE DEMONSTRATION
THE STRONG ELECTRIC CORP.
CITY PARK AVE. TOLEDO 2, OHIO
PROJECTION LAMPS
SPOTLIGHTS • RECTIFIERS • REFLECTORS

LETTERS TO THE EDITOR

(*Continued from page 20*)

rounding for picture presentation.

Recent descriptions of "illuminated surround" installations appear to represent makeshift, superimposed stage flats, constructed cheaply for the novelty, and doing little to create the desired illusion of greater size and space.

Why eliminate the black masking if the audience is still conscious of the framed effect created by the projector aperture?

To achieve a really new and exciting effect, it is necessary to carry the screen surround clear to the sides of the auditorium, enlarge the screen image, and illuminate the surround in such manner as to minimize the line of demarcation projected from the aperture.

In this regard, there is little doubt that the French and British systems of beam splitting, and projecting the actual colors and intensities of the film to the surround, are preferable and superior.

We have experimented here with enlarged surrounds, various arrangements of wings of screen material, and neutral masking, and find that in a darkened viewing area the picture still looks masked unless there is a high level of similar light on the area immediately around it.

L. F. ADAMS
Trans-Arabian Pipeline Co.
Beirut, Lebanon.

* ***Ed note: IP January, 1952, page 16; February, 1952, page 18.***

To the Editor of IP:

It is my understanding that in televising film subjects the projectors used are the same in principle as any other 16- or 35-mm machines, the one exception being the 2-3 movement of the film intermittent.

My question is, why are the better makes of machines so very expensive? Is it the highly complicated movement of the film intermittent that runs up the cost, or are prices high because the market is limited to the 108 television stations operating in this country at present. If the latter, what is the prospect of prices coming down when the new high frequencies hit the air?

J. RAYMOND WALKER
Secretary, Local 587
Longview, Texas

Ed. note: Two leading makers of these projectors comment as follows:

The high cost of these projectors is partly due to the special design but mostly to the limited quantity manufactured at a time. In other words, the modifications require practically tool room methods of production. Prices could be reduced, of course, the percentage depending on whether sufficient quantities of television projectors would be required to enable proper tooling up. As you can appreciate, tool costs run extremely high and must be apportioned over the number of equipments that will eventually be sold. Even if the number of television stations were to increase threefold, this still would mean a relatively small demand for these special equipments. Therefore, frankly, I cannot see any material reduction in the price of television projectors in the near future.

* * *

Supply and demand, and the greater cost of the intermittent movement, are one or two of the answers. There are other reasons. One is that the machine has a number of features not apparent to the eye. There are tighter tolerances, and the equipment is built for heavier duty with longer-wearing parts. The special 2-3 movement makes necessary special power supplies and special motors for the synchronizing and phasing requirements of the projector.

Also, considerable monitoring and switching equipment is required, which is included in the price. Engineering costs also have been heavy. To keep up with the fast-moving TV requirements we have had to keep engineers constantly engaged in design and development. Whereas theatre 35-mm projectors are turned out in the factory in 1,000-quantities, we have never had runs of more than 50 of these Tv projectors on any one order. As to an expected drop in price when the new frequencies come into use—doubtful. Any saving arising out of greater quantity is likely to be overcome by generally rising manufacturing and engineering costs.

Milk Depot Becomes TV Studio

Huge Sheffield Farms dairy depot and office building on West 57th Street and 11th Avenue, NYC, has been taken over by Columbia Broadcasting System to be rebuilt into the largest television studio in the East, according to Frank Stanton, CBS president. Depot's floor space, originally devoted to receiving dairy products for redistribution throughout New York, measures approximately 9 acres, divided among 6 floors, 2 basements, and a roof that is large enough to receive helicopters bringing newsreels from out-of-town regions where TV cameras may not be available.

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BIG FUTURE FOR THEATRE TV

(*Continued from page 10*)

Any one kind of audience is too limited in size. "We must have plays and musical comedies and ice shows for those who like entertainment, operas and ballets and concerts for the more culturally minded, news telecasts and educational features for the mentally alert. Once we have this varied range of product—and we hope that it will prove to be a wider range than Hollyood dished out during most of the years of its existence—theatre Tv will become an established part of our national way of life."

Matthews saw no difficulty in the way of obtaining such attractions. When more theatres are equipped to show video programs they can out-bid any video advertiser for any program they want. Even now, the theatres managed to out-bid the advertisers for the exclusive showing of the Maxim-Robinson fight.

At present, some Tv showings are not profitable to theatre owners because programs are so few that the telephone company's full monthly standby fee—or even several month's standby fees—may have to be paid by only one Tv audience. But as theatres come to play more Tv programs that same monthly rate will no longer seem large. And as more theatres participate in showing long distance programs the long distance rates, divided up among a number of participating houses, will become far less important than now.

But even at present it is possible for a theatre owner to earn some profit over and above his program, standby and service costs. In the future, as a wider selection and greater number of programs become available, "theatre Tv can and will produce big profits." And the sooner theatre owners buy and install the equipment, Matthews maintained, the sooner those profits will start to flow in.

New LaVezzi Catalog

Free on request to any projectionist or other interested person, the latest LaVezzi catalog of projector replacement parts and repair tools is abundantly illustrated, attractive, and easy to follow. A price list is included.

The bulk of the catalog's 44 pages is devoted to listing parts for standard Simplex and Super-Simplex mechanisms. An abundance of well-numbered illustrations makes every part easy to identify by catalog number and name. Subsequent pages illustrate and list replacement parts for Simplex E-7 and for Century "C" and "CC" mechanisms; and sprockets for RCA, Western Electric, Simplex-Acme, Simplex-SP, Simplex 4 Star, Holmes, Ernemann and Phillips soundheads and projectors. Special sprockets for 16-mm and 35-mm cameras; developing, printing and editing machines, viewers and the like, also are presented. LaVezzi tools and conversion and repair kits are shown.

Requests for free copies of this catalog should be addressed to LaVezzi Machine Works at 4635 West Lake Street, Chicago 44.

TESMA Committee Chairmen Named

Bob Hoff, President of the Theatre Equipment and Supply Manufacturers Association, has appointed a number of committees to help in managing details of the organization's forthcoming convention. The chairmen are: W. C. DeVry, convention chairman; Oscar F. Neu, honorary chairman; Roy Boomer, convention coordinator; Lee Jones, press relations; V. J. Nolan, registration; Fred Matthews, reception; Bob Engel, TEDA liaison, and Larry Davee, hotel registration. The convention is scheduled for November 15th to 19th at the Morrison Hotel in Chicago, jointly with the Theatre Equipment Dealers Association and the Allied States Association of Theatre Owners. The prospectus calls for public exhibits of theatre equipment by nearly 150 manufacturers.

HEART OF THE PROJECTOR

(*Continued from page 6*)

of the Victorian period—the early days of the projection art—that it is difficult to decide which intermittent to discuss first. Although the first motion-picture projector (Lumiere) had a claw movement, many other projectors utilized the striker, or beater, movement.

Figure 1 illustrates this type of intermittent. In many a hand-cranked nickelodeon projector it imparted to the film the combination of sudden jerk with a long rest period for the exposure of Francis X. Bushman in a single stage of motion.

The Striker Movement

At *A* we see the "dog striker." This consisted of a flywheel with an arm or roller projecting from its side into the film-path. The roller was the striker which gave the film a vigorous *whack* at each rotation of the flywheel. Between whacks, the film-loop was shortened by a large constant-speed sprocket which was geared to pull down one frame per whack of the striker. And the pull-

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down sprocket had to revolve at a *really* constant speed if the picture were to be reasonably rocksteady. Which it seldom was.

Overshooting was a common defect with this movement. But in those days people thought the film had stopped running when the image was rocksteady. The picture was a *moving* picture in every sense of the word.

In addition to vertical unsteadiness the long length of film between the constant-speed pulldown sprocket and the aperture imparted a gavot-like weaving to the image when shrinkage of the film was uneven. (It is a requirement for all intermittent movements that the pulldown mechanism, be it a claw or an intermittent sprocket, be placed as close to the aperture as possible in order to minimize vertical weaving caused by varying degrees of film-shrinkage.)

In *B* of Fig. 1 a less barbarous striker movement is shown. This was the "plunger" movement in which the flywheel worked an oscillating piston-striker for smoother osculations when patrons demanded passion with their popcorn. In some machines a piston striker was located at both top and bottom of the gate to lessen the strain on the film.

All striker movements were extremely noisy, most of the noise being caused by the *sudden* (not gently accelerated) pulldowns of the film. The only obvious advantages of the striker movement are the simplicity of design and the fact that films having torn sprocket-holes wend their jerky way through the beater with no more picture-jumping than a new print would give.

The Claw Movement

The early Lumiere machines, among other makes, used the claw movement, a type of intermittent seen today in certain makes of professional 35-mm sound-film cameras, in practically all non-professional 16-mm and 8-mm cameras, and in most 16-mm and 8-mm projectors.

The claw arrangement illustrated in Fig. 2 is a simple 1:1 movement. In any 1:1 movement the rest- and pull-down-periods are of equal duration, while in the conventional 3:1 geneva movement the sprocket is at rest 3 times as long as the pulldown period lasts. A 1:1 movement is obviously a poor intermittent for projectors, though good for cameras. (Motion-picture cameras do not need a balancing cut-off blade on the shutter.)

Ratios as high as 7:1 or 8:1, however, can be obtained with claw, or shuttle, movements of different design. The claw intermittent, while extremely accurate in action, producing perfectly rocksteady pictures, is impractical for theatre projectors because of the punishment the claw-tooth inflicts upon the film perforations.

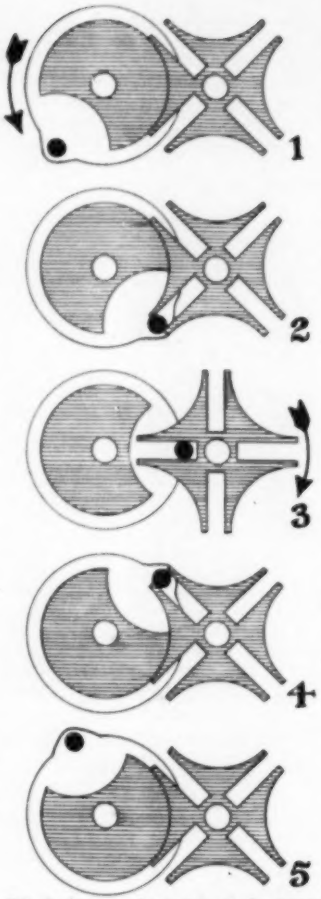

FIG. 3. Operational principle of the conventional 3-to-1 geneva intermittent movement, the standard in 35-mm projection today.

Most of the early motion-picture cameras employed claw movements, which accounts for the rocksteady registration of the picture frames photographed on the film in many old-time movies. Jumping, when it made its appearance on the screen, was often the fault of the theatre projectors, especially when striker movements were used.

The reverse is usually the case today. Unsteadiness, when present, is usually either photographed on the film by cameras not properly supported, or caused by improper printing of the positives. One major producer seldom issues black-and-white prints that are perfectly rocksteady because the laboratory that prints his release positives still uses old-fashioned step-printers left over from the era of silent pictures.

If the picture weaves and jumps *on the film*, there is nothing the projectionist can do to remedy the situation. Complaints to the distributor will do no good—he will merely point out with considerable smugness that the print ran in other theatres without eliciting complaints.

(To detect jumping of the picture *on the film*, run the offending reels out of frame so that the frame-line extends across the middle of the screen. Any movement of one half of the picture relative to the other half indicates poor printing or sloppy camera work. Jumping caused by damaged perforations or irregular shrinkage of the film cannot be detected by this test, however.)

The Power's pin-cross intermittent comes next to mind; but even before this unique and eminently satisfactory movement was invented, the familiar geneva movement had enjoyed wide use. Even the Edison Kinetoscope projector employed a geneva movement with a 4-slotted star-wheel, although driven through a system of levers to accelerate the movement during pulldown beyond the normal 3:1 ratio. The Optigraph, too, had a standard geneva movement; and in both these machines the star and cam were exposed, and had to be oiled like other gears of the mechanism.

The Geneva Movement

The geneva or maltese-cross intermittent is a device borrowed from the stop-mechanisms of Swiss music-boxes and watches made in the famous city of Geneva.

Figure 3 illustrates the principle of operation. The four concave sides of the slotted star-wheel are so proportioned that they fit snugly ("lock") against the rim of a pin-wheel (more commonly called a "cam") which carries a driving pin.

At each revolution of the cam the driving-pin enters a star-wheel slot positioned tangentially to the path of the pin. After entrance, the pin pushes the star, together with the sprocket attached to the same shaft, one-quarter of the way around. From the time that the pin leaves one slot until it enters the next slot, the star with the intermitten sprocket is motionless and locked in position.

(TO BE CONTINUED)

New Ansco Hypan

Ansco (General Aniline & Film division) has announced a new and improved version of its black-and-white Hypan 16-mm film. Features claimed for the New Hypan are blue-black image tone, clear whites, medium brilliant gradation, and increased speed (A.S.A. Index 40). Prices, which include processing, are $4.27 per 50′ roll and $7.35 per 100′ roll.

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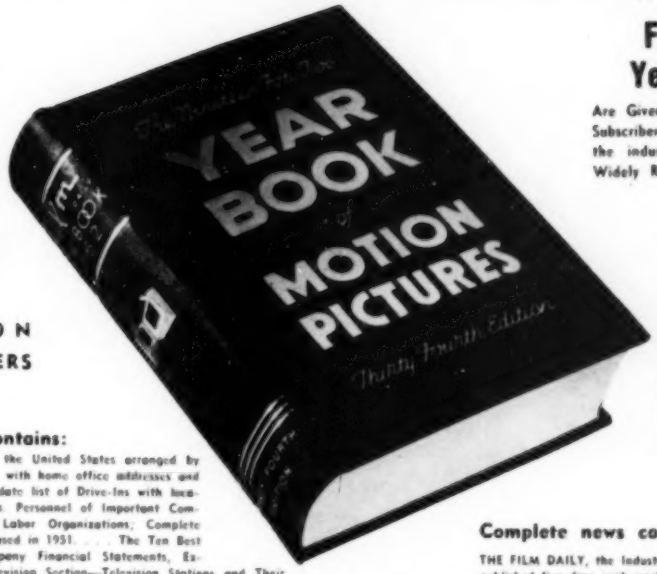

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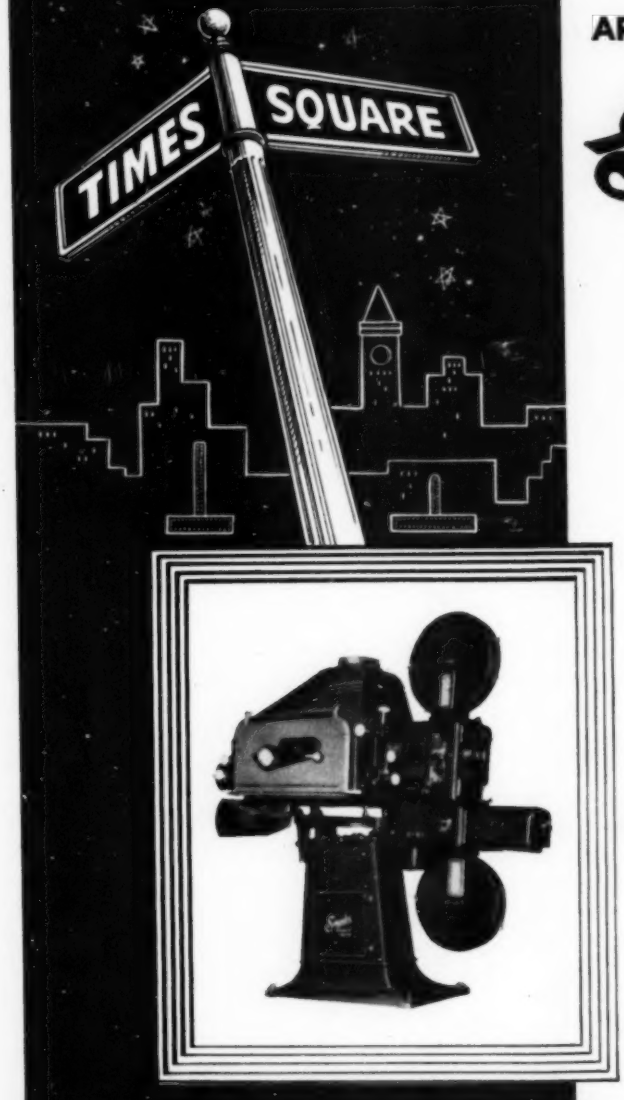

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